Pit and Quarry

SAND • GRAVEL • STONE

HANDLING • CRUSHING • SCREENING • WASHING

"HERCULES SOLID WELD"

STEAM SHOVEL CHAIN

The Chain That Puts the Shove in Steam Shovels

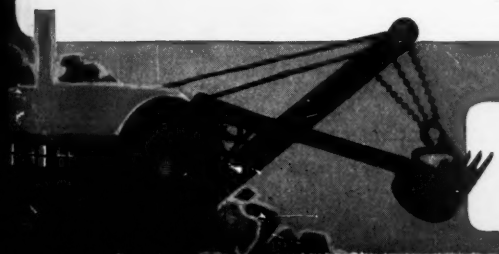
In use for many years. Will not open at weld or go to pieces before it actually wears out.

Manufactured only by:

The Columbus McKinnon Chain Co.

Columbus, Ohio

Canadian Factory:
THE McKINNON COLUMBUS CHAIN, LTD.,
ST. CATHARINES, ONT.



OCTOBER, 1919

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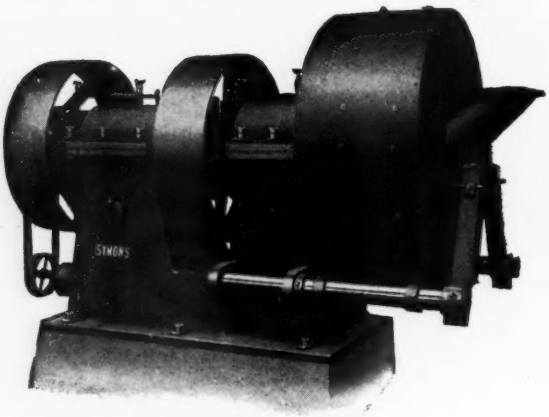
SYMONS

Disc Crushers



*Actual Results Reported by Operators Crushing Gravel.

Size Crusher	Size Feed	Size Product	Capacity Tons per Hr.	Power
18 in.	1½ in.	¾ in.	12	20 H. P.
24 in.	2 in.	½-1 in.	25	20 H. P.
24 in.	1½ in.	½ in.	15	30-40 H. P.
36 in.	2-4 in.	¾ in.	50	35 H. P.
36 in.	3½ in.	¾ in.	50	25-30 H. P.
36 in.	½-4 in.	1 in.	30	40 H. P.
48 in.	2-7 in.	1 in.	50	50 H. P.
48 in.	3 in.	¾ in.	45	

*Names supplied on request.

Tell us exactly what you want to accomplish. We will recommend proper crusher to use.

Manufactured and Sold by

Chalmers & Williams, Inc.

Chicago Heights, Ill.

Operation of the ERIE shovel is very simple. Only three levers. Experienced shovel operators prefer to work on an ERIE.

"Now use 500 lbs. less coal, and only one man"

"We are delighted with the results obtained with our ERIE Shovel.

"The ERIE is doing its everyday duty of digging 350 cu. yds. of sand and gravel, with one man both operating and firing; and using about 500 lbs. of coal.

"To do the same work last year with our previous shovel, we needed one more man and twice the coal."—

William G. Harper, President, Meadville SAND & GRAVEL COMPANY, Meadville, Pa.

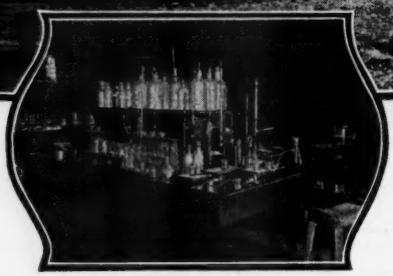
When required, the ERIE Shovel gives 500 to 600 cu. yds. of gravel per day, or more. Also very efficient for loading rock—the ERIE is built far stronger than the usual standard of steam-shovel construction.

We will be glad to send you a bulletin showing just what the ERIE can do. Write for Bulletin Q.

Serves either as a Steam-Shovel or as a Locomotive Crane (with Clamshell Bucket)

BALL ENGINE CO., Erie, Pa.
Builders of ERIE Steam Shovels and Locomotive Cranes, BALL Engines

ERIE Revolving Shovels



"The acid test" has a real meaning at the "Marion" plant. Here is a corner—just a corner—of our Chemical Laboratory, where careful analysis is made of all the materials that go into "Marion" equipment.

A Cut "Five Stories Deep"

They go deep on the property of the Bessemer Limestone Co., Youngstown, Ohio, and Bessemer, Pa. First, through an overburden of topsoil; then a vein of good coal; next a thick bed of fireclay; after that, a course of brick-making shale; and fifth, a deep stratum of commercial limestone.

Five "Marion" Shovels owned by this corporation are doing the work—doing it with an efficiency, economy and a businesslike precision that has quite won the owners' hearts.

"Marion" service on this particular operation is a good index of the work hundreds of other "Marions" are doing on important jobs, the world over.

"Marions" will do *your* work—will *see it through*. We shall be pleased to send particulars.

THE MARION STEAM SHOVEL COMPANY

Established 1884 Marion, Ohio

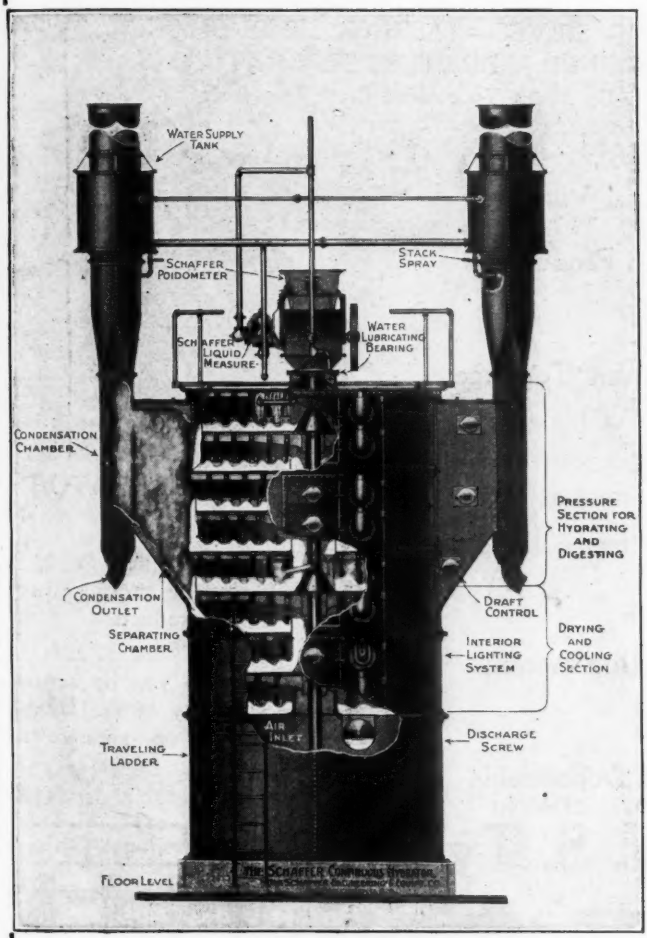
CHICAGO NEW YORK SAN FRANCISCO

Marion

Continuous! Automatic!

The SCHAFFER Lime Hydrator

is both of these—and more. It saves labor. It gives a flexibility in operation to meet market conditions. It operates on either high calcium or dolomite limes. It uses less power than other systems, at the same time producing a superior quality of finished product.



Our literature tells all about this and other Schaffer Products. Send for it.

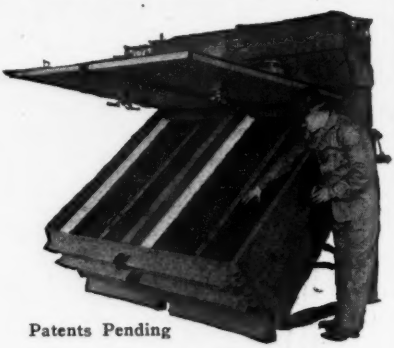
The Schaffer Engineering & Equipment Co.

Peoples Bank Building **PITTSBURGH, PA.**

"TYLER"

DOUBLE
CRIMPED WIRE CLOTH
TON-CAP SCREEN
TESTING SIEVES—TESTING SIEVE SHAKERS
INCLINED VIBRATING SEPARATORS
Write Us About Your Wire Cloth Requirements

High-Speed Electrical Vibration
Uniform Product
Maximum Tonnage
Maintained at Drumhead Tension
Effective Sorting Action
Reliable and Dependable



Patents Pending

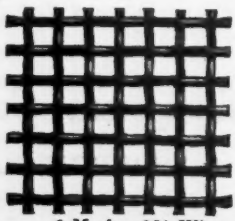
HUM-MER SEPARATOR

For Screening Silica, Sand, Gravel, Limestone and all other Rock Products

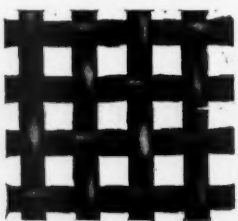
Let us prove to you by actual test the efficiency of the Hummer Separator on your own material.

The W. S. Tyler Co.

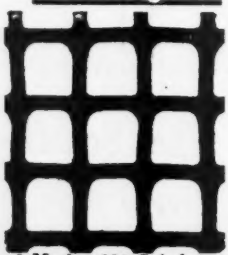
Cleveland, Ohio



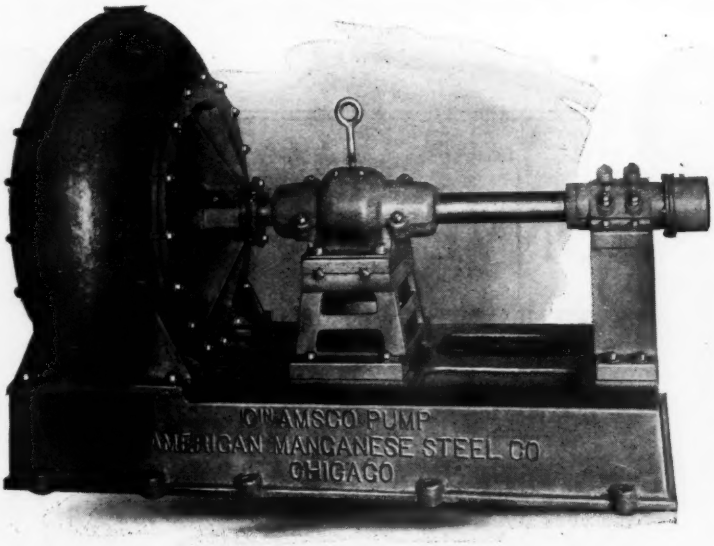
6 Mesh; .054 Wire



3½ Mesh; .135 Wire



3 Mesh; .080 Galvd.



AMSCO Centrifugal Sand and Gravel Pumps have proven beyond doubt that they produce Sand and Gravel at the lowest upkeep cost per ton.

Standard AMSCO Pumps are Built in 6″, 8″, 10″, 12″ and 15″ sizes and larger sizes are built to suit conditions.

Flap Valves, Elbows, Pipe Flanges and Straight Pipe are also made of AMSCO Manganese Steel.

Write for Pump Bulletin

American Manganese Steel Company

General Sales Office: McCormick Building, Chicago

Western Sales Office: Newhouse Bldg., Salt Lake City
San Francisco Office: Insurance Exchange Bldg.
Eastern Sales Office: Hudson Term. Bldg., New York
Foundries: Chicago Heights, Illinois
New Castle, Delaware
Oakland, California

CONVEYOR BELTING

Do you have a difficult job in keeping your conveying costs down?

Low initial costs don't necessarily mean you have secured the most economical belt for your individual use.

How does it check up when length of service, tonnage conveyed or loss of time for belt repairs is considered?

DESERT

Is a consistent deliverer of large tonnage of conveyed material; eliminates the costly shut downs for belt repairs and stays in service for a long time, thus commanding the respect of all users who need a high grade belt for their work.

DESERT is constructed of extra heavy duck, each ply of which is held together by a friction so strong that it resists separation to the utmost. The cover is of a quality that successfully withstands the action of sand, gravel, stone, cement and other materials being conveyed.

Let us figure on your belting requirements. Estimates and samples gladly submitted.

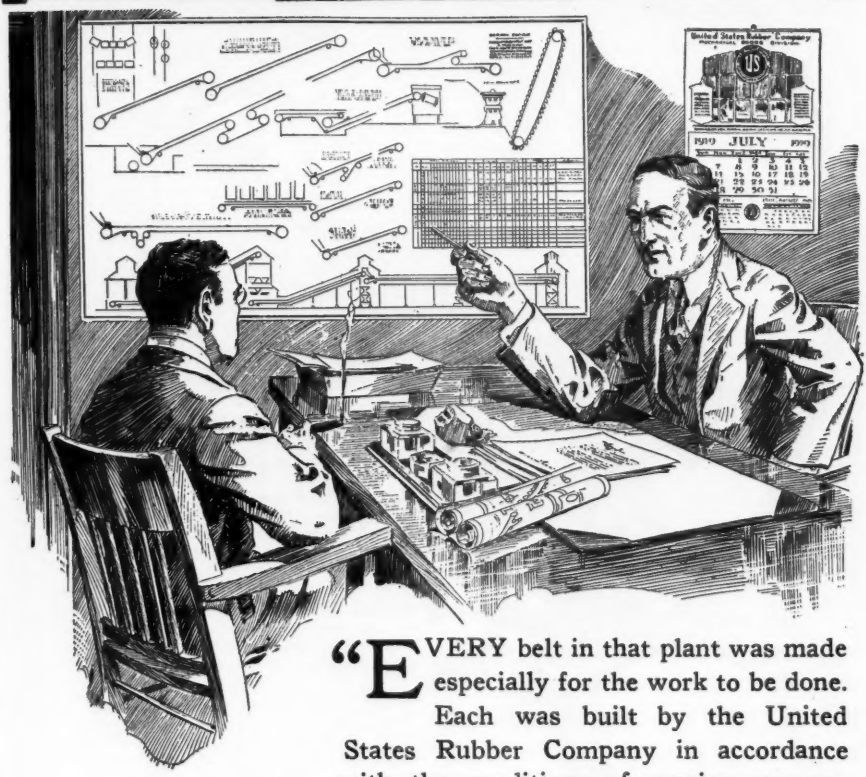
QUAKER CITY RUBBER CO.

Manufacturers of Mechanical Rubber Goods

Philadelphia 629 Market St. Chicago 182 W. Lake St. Pittsburgh 211 Wood St.

New York, 53 Murray St.

Conveyor Belts



"EVERY belt in that plant was made especially for the work to be done. Each was built by the United States Rubber Company in accordance with the conditions of service our engineers found it would encounter. Upon their previous examination of the plant depended, in every instance, the weight of duck, the rubber friction, the number of plies, and the kind and thickness of cover. Furthermore, the United States Rubber Company engineers personally supervised the installation. The Conveyor and Elevator Belts in that plant, built right and installed right, are bound to give satisfaction."

United States Rubber Company

HERCULES POWDER CO.

Quarrying in 402 B. C.

In 402 B. C., Dionysius the Elder—tyrant of Syracuse—began to build a wall about his city. 7000 Athenian captives labored under the lash to quarry the rock. Yet it took 17 years to produce the stone with which this wall, only six and one-half miles long, was built.

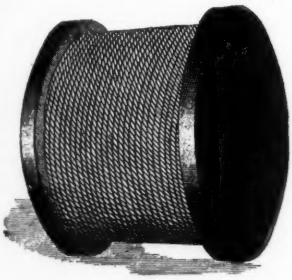
Though rich in culture and the spoils of war rich in slaves and captives—Syracuse was, from our standpoint, desperately handicapped by her ignorance of the power of explosives.

Today a few pounds of Hercules dynamite or blasting powder in the hands of the quarrymen take the place of Dionysius' thousands. Huge blocks of stone many hundreds of tons heavier than the largest that came from the Great Quarry of Syracuse are taken from our granite hills with the help of Hercules Explosives.

Wherever there are mines or quarries, where tunnels are being built or canals dug, where roads or railroads are being graded—in fact, practically everywhere that work for the material advancement of mankind is going on; you will find Hercules Explosives playing an important part.

HERCULES POWDER CO.

Chicago St. Louis New York
Pittsburg, Kan. Denver Hazleton, Pa.
San Francisco Salt Lake City Joplin
Chattanooga Pittsburgh, Pa. Wilmington, Del.



The Rope on the Incline

Must have great wearing surface and flexibility

Williamsport Standard coarse laid rope is recommended for this use. The Lang Lay Construction is especially desirable for incline service on account of the greater length of wire exposed to wear and the greater flexibility which it affords. There is a grade of Williamsport rope for every pit and quarry use. And all grades are made of wire drawn in our mills, so that we can guarantee the highest attainable quality.

We have a complete line of all grades and sizes of Williamsport rope in stock in the Chicago warehouses. All producers in the states conveniently served from Chicago will find it greatly to their advantage to use this Williamsport service. Write for our discounts.

Williamsport Wire Rope Company

Chicago Office:
122 So. Michigan Ave.

Chicago Warehouses:
753-55 W. Quincy St.

Telephone
Harrison
8201

"Very Satisfactory"

is what Holbrook & Skinner say of

The BAY CITY LOADER

For Pit and Quarry Service

This machine is in operation loading gravel at their plant in Lansing, Mich. It is rendering excellent service and Mr. Skinner most willingly said so.

The BAY CITY Loader operates a powerful digging bucket that takes a big load at every bite. Handles a large amount of material at very low cost. Can be used for stripping, grading and loading sand, gravel or clay from bank into cars or wagons. Operating and upkeep costs small.

Write for full description.

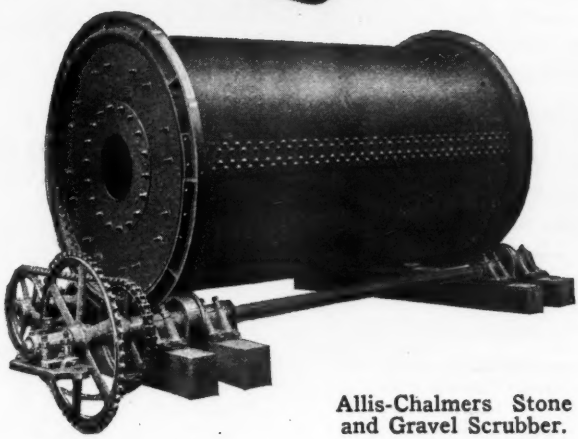
BAY CITY DREDGE WORKS

BAY CITY MICH.

One Responsibility

We design and equip COMPLETE GRAVEL WASHING, GRAVEL CRUSHING AND GRAVEL SCREENING PLANTS.

Allis-Chalmers Conical Screens.



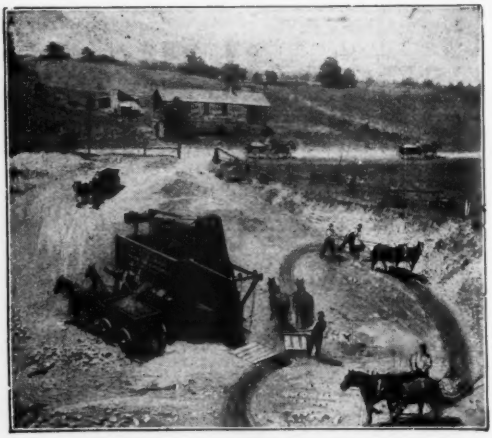
Allis-Chalmers Stone and Gravel Scrubber.

Write for our Bulletin No. 1436 A.B.

Sales Offices in all Principal Cities.

ALLIS-CHALMERS

Milwaukee. Wis.. U. S. A.



GALION EQUIPMENT

in

PITS AND QUARRIES

Means That Things Go with a Snap and Jump!

GALION Loaders and unloaders and combination screening plants and loaders are remarkable time and labor saving agents for pits and quarries. When GALION equipment gets on the job, things begin to hum all along the line.

Production is Speeded Up and

PROFITS INCREASE

For example: A GALION UNLOADER can unload 500 to 600 TONS of stone PER DAY, keeping trucks or wagons going at top speed. A machine of this kind releases labor urgently needed elsewhere on the job and thus solves the labor problem, as well as greatly INCREASING PROFITS.

We have issued some very interesting bulletins. Shall we send you one?

THE GALION IRON WORKS AND MFG. CO.

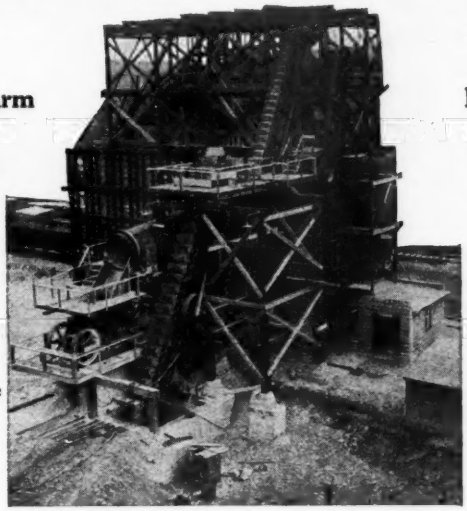
GALION, OHIO

GOOD ROADS
INCORPORATED

REQUIRE CLEAN SAND AND GRAVEL

Plants Like This Produce It Economically and Efficiently

Flexible Arm Shaker Screens



Dragline Settling Tanks

Automatic Knockers.

No Clogging.

Interchangeable Steel Screen Sections.

Clean Sand.

All Grades.

Adjustable Overflow Gate.

Automatic.

No Dripping.

Less Power—Larger Capacity—Less Head Room

These are some of the features surrounding the plants which we design and equip and the advantages are fast becoming recognized by leaders in the field.

We Manufacture:
Crushers, Conveyors,
Elevators, Feeders,
Screens, Chutes,
Road Building and
Contractors' Machinery

Factories at:
Kennett Square, Pa.
Groton, New York
Marathon, N. Y.
Fort Wayne, Ind.
Delphos, Ohio

Our engineers are at the service of all who are interested in sand and gravel crushing, screening and washing equipment. They will gladly offer suggestions and submit estimates on any kind of installation, large or small, that may be required.

Catalogs on Request.

The Good Roads Machinery Co., Inc.

1203 Tower Bldg. **CHICAGO, ILL.**

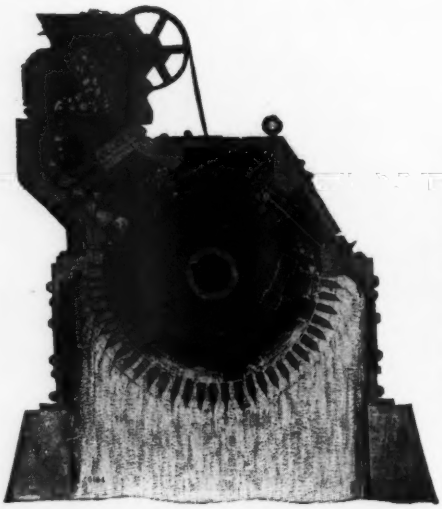
ESPECIALLY ADAPTED

For Making

AGRICULTURAL LIMESTONE

Note:

Grinding done in suspension leaving screen bar openings clear to give large capacity at less power.



Note:

Automatic Feed.
Reversible Double End Hammers.
Easy accessibility to screen bars and hammers for renewal.

JEFFREY TYPE "D"

Ball Bearing Pulverizers

are being installed by leading quarry operators for increasing their plant capacities to meet the constantly increasing demand for ground limestone.

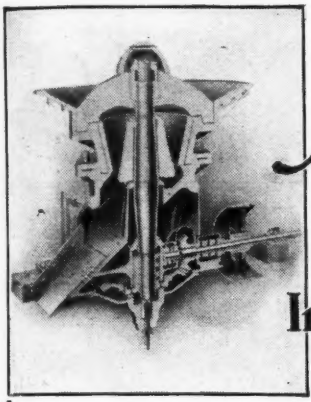
Complete information in Pulverizer Catalog No. 147-K.

The Jeffrey Manufacturing Co.

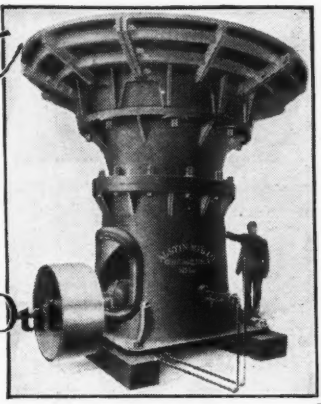
990 North Fourth Street **Columbus, Ohio**

New York Philadelphia Chicago Birmingham Milwaukee Seattle
Cleveland Boston Pittsburgh St. Louis Dallas Denver Montreal

Manufacturers of Pulverizing, Conveying and Elevating Machinery, Chains, Self-Propelling Loaders, Locomotives, etc.



Austin
Rock Crushing
Equipment
Examine
both
Inside and Out



Austin Gyratory Crushers and Quarry Equipment

The demand for crushed stone is an ever increasing and permanent one. Why not make a permanent business of supplying the trade?

Austin Crusher Equipment is permanent in the sense that it is built to last. Steady output from day to day with small repair bills is the Austin way of cutting down production costs.

Quarry owners who are often remote from machine shop help appreciate Austin durability.

Austin screens, elevators, quarry cars, hoists, etc., are built like the crusher TO LAST.

Get our new crusher catalogue No. 28. It tells you how to go about fitting up a modern quarry with money-making equipment.

AUSTIN MANUFACTURING COMPANY

New York Chicago San Francisco

During the War the United States and Allied Governments purchased over 700 Austin Motor Road Rollers; more than ten times their combined purchases of all other rollers and at higher prices.

WILLIAMS

2 -- IN -- 1 CRUSHER

This machine will take Limestone, Lime, Gravel or Gypsum in cubes 14" x 16" and under, depending on size of crusher, and in one operation reduce same to 2", 1", ¾", ½", ¼", ⅛" or finer. Capacities range from 1½ to 40 tons per hour. Outstanding features are: Low Horse Power, Slow Speed, Small Floor Space, and instant adjustment for any size product desired. Complete information given in

Bulletin No. 85

General Sales Dept.
37 W. Van Buren St.
Chicago

Western Office:
67 Second Street
San Francisco

The above photograph shows a Style A, B-G Self-Feeding Bucket Loader at work on Jefferson Highway near Minneapolis. The entire job from loader to mixer is being done mechanically.

As to the work the B-G Loader is doing here the foreman stated emphatically that he "would rather lose any other piece of equipment on the job than the B-G Loader."

Another labor-saving device is the B-G Conveyor.

B-G Conveyors are Belt Conveyors—soundly built—portable type (12 feet to 60 feet) and stationary type (in any length) —equipped with electric drive, supplied with gasoline engine when required—operation costs low—working capacity up to 150 tons per hour.

Fill the Labor-Breach!

ELIMINATE the difficulty of scarcity of men by using a B-G Self Feeding Bucket Loader.

This machine does the work of many men and fills the breach when labor is scarce and hard to get—and keep.

Contractors who know how to get big results quickly are using the

B-G Self-Feeding Bucket Loader

The Patented Bucket Feeding Device is a distinctive B-G feature. It consists of two horizontal discs (set close to the ground) which cut under the piles of material and, revolving inward toward the buckets, convey the material to them.

Where you have to handle sand, gravel, crushed stone and similar materials you can't beat the performance of the B-G Loader.

Write for complete information.

BARBER-GREENE CO.

605 West Park Ave., Aurora, Illinois, U. S. A.
Southern Branch: Birmingham, Alabama

Branch Service and Sales Offices:

New York	Tampa	Minneapolis	Louisville
Norfolk	Detroit	Portland	Philadelphia
Salem	Pittsburgh	Savannah	Salt Lake City
Hartford	Scranton	St. Louis	Los Angeles
Buffalo	Chicago	Omaha	San Francisco
Cleveland	Milwaukee	Kansas City	New Orleans
	Utica	Indianapolis	

Canadian Agents: Mussens Limited
Montreal, Toronto, Winnipeg, Vancouver

EXPORT DEPARTMENT
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA
51 Chambers St., New York, U.S.A. Cables: Almacoa New York

"Shay" Locomotive in Quarry Service

Cost Reducers

"Shay" engines reduce switching costs. They attain speed in 22% less time than a rod engine.

They spot cars 11% quicker.

They are easier and cheaper to maintain than a rod engine—every part is a "one man" part and can be easily adjusted by one man without special tools.

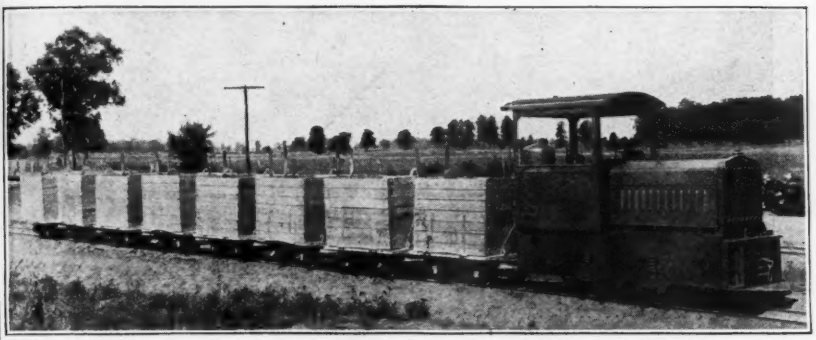
Write us for records of "Shay" performance.

Lima Locomotive Works, Incorporated
LIMA, OHIO

New York Office, 30 Church St.

Whitcomb Gasoline Locomotives

ALL SIZES FOR ALL CONDITIONS



Whitcomb 6-Ton, 3-Speed Road Contractor's Special

Everything in Gasoline Locomotives from a Little 2½-Ton Machine to a 25-Ton Standard Gauge Locomotive

Above is a Whitcomb 3-speed, selective gear type, open cab gasoline locomotive. These machines built in all gauges, 18″ to 48″, and in sizes 2½, 4, 5, 6, 8 and 10-tons.

Friction Drive machines built in sizes 3, 5 and 6½-tons —All gauges.

Heavy Duty 2-speed Locomotives in sizes, 7, 8, 9, 10, 11, 12, 13, 14 and 15-tons—All gauges from 24″ to 56½″.

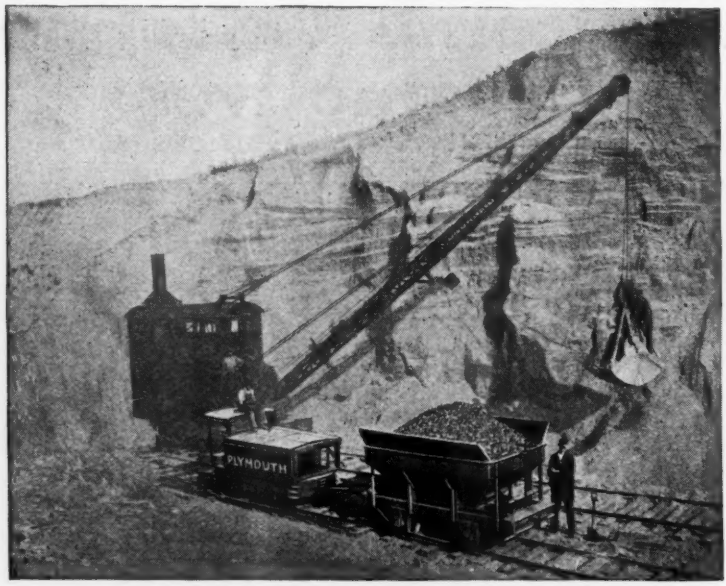
Standard Gauge Switchers in 10, 12, 15, 17 and 25-tons.

Geo. D. Whitcomb Company

(Oldest and largest builders of Gasoline Locomotives in the United States.)

Main Office and Works: **Rochelle, Illinois**

Write us for further information.



PLYMOUTH

Gasoline Locomotives

Let it Boost *Your* Yardage, Too!

One "Plymouth" Gasoline Locomotive owned by the J. E. Carroll Sand Co., Buffalo, N. Y., worked this double advantage for its owners from the very start:

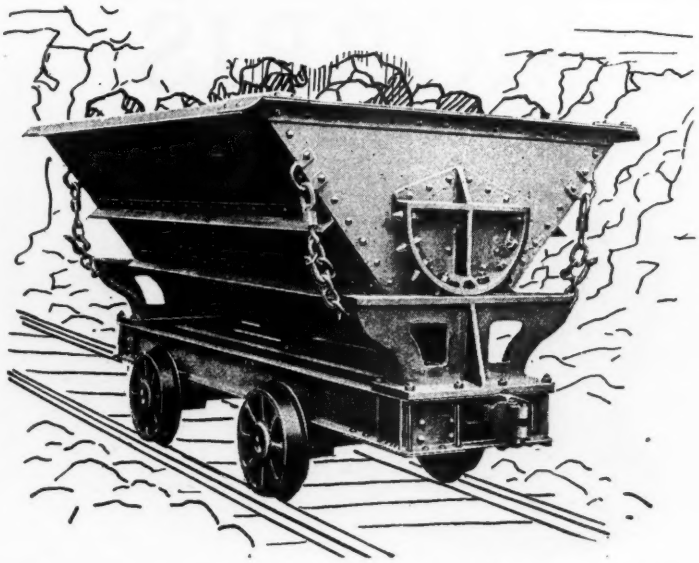
It increased output over 50 per cent, and it enabled the company to produce for considerably less per yard than had been possible before.

"We find the 'Plymouth' operates quickly and efficiently," President J. E. Carroll wrote us after giving it a thorough-going trial.

"Plymouth" Gasoline Locomotives are really revolutionizing haulage for sand, gravel, stone and cement companies all over the country. Don't you want to know more about them? Our books contain live, interesting haulage stories—glad to send them with full particulars, if you will write, stating fully the conditions of your own haulage.

THE J. D. FATE COMPANY, 206 Riggs Ave., PLYMOUTH, OHIO

New York Philadelphia Norfolk Pittsburgh Cleveland Detroit
Kansas City Minneapolis Portland



Observe Its Sturdy Construction!

It's a

WATT CAR

Regardless how big or complex your hauling problem is, WATT CARS are equal to the task. They are equal to it not only because of their sturdy construction, but because they are especially designed to meet individual requirements.

These cars are built with old-fashioned care in a modern, highly specialized factory, devoted exclusively to this class of construction.

Watt Cars last a lifetime and during their life they are always "on the job." An excellent investment both from the standpoint of value received, but because they will increase the productivity of your plant.

The Watt Mining Car Wheel Co.

Barnesville Ohio

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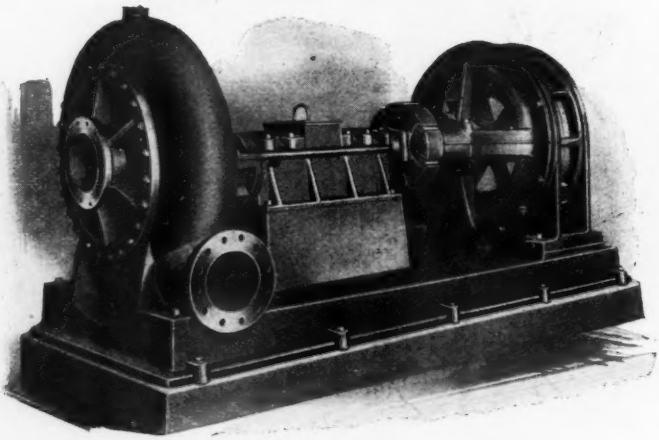

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A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime
Member Audit Bureau of Circulations

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Pit and Quarry

Vol. 4 Chicago, Ill., October, 1919 No. 1

Give Your Association A PAID SECRETARY

ONE of the axioms among people who have given special attention to association work, is that an association, in order to have the greatest success, must have someone whose sole business it is to promote the interests of the organization.

It sounds all very well for a bunch of men to get together and say they will pass the duties of the organization around from one to the other, each man's service to be contributed as a free-will offering for the good of the cause, and thus keep expenses down to the minimum; but in actual practice such an organization does not reach its highest possibilities.

Each one of these men has his own personal business to attend to, and if he expects to see it succeed and keep out of the hands of a receiver, it must have the first claim upon his time and thought. So the association gets such attention as can be given it, at times when other things do not press; while probably just at the time when the association should have the most active work in its behalf, private claims are also most urgent and association affairs go over until a more convenient season.

The history of work of this kind is that the employment of a paid secretary has always been justified. Sometimes he has been able to increase the membership sufficiently to pay his salary without increased costs to the individual members; while in cases where it has been necessary to raise the individual contribution, the increase has been more than justified by the greater benefits derived by the membership.

There are a number of state, district and local organizations in the crushed stone, sand and gravel fields which are not securing any great measure of tangible results, simply because nobody is paid to be on the job and look after the interests of the members. A good man working on the job all the time, with nothing else to think about, can get results which are absolutely impossible under the loose type of organization where there is no centralized responsibility.

We recommend these suggestions to the careful consideration of the various associations in our field who do not already have paid secretaries, believing that they can make no better move at the present time than by securing a first-class man for such office, paying him an adequate salary, and giving him a comparatively free hand to work out improved conditions in the locality covered by the membership. If he does not justify himself and earn every bit of the salary paid him, it is because a mistake has been made in his choice, and not through any fault of the general plan.

How to Get a Side-Track

BY BEN STONE
Business Director, Illinois Sand and Gravel Producers Association

IN VIEW of the rapid changes taking place in the railroad situation it may be worth while to give a review of the present regulations with regard to construction of industrial side tracks and leasing of waylands for industrial purposes.

Prior to Federal operation of railroads there was no uniform basis as among the several lines, nor was there a definite policy on any individual road, for the construction of side tracks to serve private industries.

The Railroad Administration has given considerable attention to this feature of railroad operation, the expressed desire being to bring about uniformity throughout the country, and remove as far as possible existing discrimination.

On March 26, 1918, General Order No. 15 was promulgated and is reprinted below as originally written:

The following requirement must be observed in respect of the construction, maintenance and operation of new industry tracks, and in respect of the operation and maintenance of existing industry tracks:

1. As to new industry tracks:

(a) The industry shall pay for, own and maintain that part of the track beyond the right of way of the railroad company.

(b) The railroad company shall pay for, own and maintain that part of the track on the right of way from the switch point to the clearance point.

(c) Generally speaking an industry shall pay for and maintain (although in special cases the railroad company may do so), and the railroad company shall own, that part of the track on the right of way from the clearance point to the right of way line.

(d) If the industry fails to maintain in reasonably safe condition the part of the track which it is required to maintain, the railroad company may disconnect the track or refuse to operate over it when not in such condition.

(e) The railroad company shall have the right to use the track when not to the detriment of the industry.

(f) The foregoing terms and conditions should be embodied in a written contract between the industry and the railroad company.

2. Where existing industry tracks are not covered by written contracts, they shall be maintained and operated in accordance with the provisions stated in paragraph 1 hereof.

3. Where industry tracks are covered by written contracts, such contracts shall be adhered to until otherwise ordered; but where any such contracts appear to work inequalities or injustice the circumstances should be brought to the attention of the regional director, who will report thereon to the Director General, if conditions seem to warrant.

4. The requirements of state statutes and of state commissions in respect of the construction, maintenance, and operation of industry tracks shall be complied with, but in cases where such compliance involves what appears to be an unreasonable burden upon the United States Railroad Administration the circumstances should be brought to the attention of the regional director, who will report thereon to the Director General, if the conditions seem to warrant.

On December 5, 1918, Supplement No. 1 to General Order No. 15 was issued and reads as follows:

General Order No. 15, dated March 26, 1918, is hereby supplemented as follows:

1. General Order No. 15 is not to be construed as requiring or authorizing a Federal Manager to enter into a contract on behalf of the Director

BEN STONE

General to pay for that part of an industry track on the right of way from the switch point to the clearance point where, in the judgment of the Federal Manager, the amount of traffic to be derived by the United States Railroad Administration from the construction of the industry track is not sufficient to justify such expenditure. In cases where, in the judgment of the Federal Manager, the circumstances justify the construction of an industry track, but the amount of revenue to be derived therefrom by the United States Railroad Administration does not justify the payment by the Director General of the cost of that part of the track on the right of way from the switch point to the clearance point, an agreement may be made, otherwise in accordance with General Order No. 15, but providing for the payment of the entire cost of the track by the shipper with a provision for refund up to, but not exceeding, the cost of the part of the track from the switch point to the clearance point, at the rate of two dollars ($2.00) per car of carload freight yielding road haul revenue, delivered on or shipped from the track during Federal control.

2. Track material contained in that portion of an industry track on the railroad right of way which was installed and paid for by the industry during Federal control shall remain the property of the industry, except to the extent that refund of the cost thereof shall have been made by the railroad of the Director General, but such ownership shall be subject to the right of the railroad to use the track when not to the detriment of the industry.

3. Upon the discontinuance of use of an industry track for the purpose of the industry, the industry shall have the right to have the track material on the right of way which was paid for by the industry during Federal control taken up and delivered to the industry, except to the extent that the cost of such track material shall have been refunded to the industry by the railroad or the Director General. The work of taking up the track shall be done, if the Federal Manager shall so desire, by the forces of the Federal Manager, but in any event at the expense of the industry.

During the early years of railroad development a great many industrial tracks were built free of charge to shippers; others were put in on a nominal basis; in some cases shippers were required to pay a substantial portion of cost, while some were compelled to stand the entire cost. A great many such tracks were not covered by contract and were maintained for years at the expense of carriers.

In late years many of the larger roads endeavored to establish individual standards to govern negotiations with shippers for construction of side tracks, but the various elements of competition entering into the transactions often defeated such purposes. It was not thought strange, therefore, when announcement was made by the Administration that uniform practices would be established.

General Order No. 15 has met with considerable antagonism, however, from shippers in all parts of the country, when attempts have been made

to apply its provisions to tracks constructed previous to Federal control, and in Supplement No. 2 to General Order No. 15 the Administration has finally relinquished its efforts to have such tracks covered by written contracts.

Modification of the original order directed by Supplement No. 2 is as follows:

Where existing industry tracks are not covered by written contracts, they shall be maintained and operated in accordance with the provisions stated in paragraph (1) hereof. In the absence of a written contract as to the maintenance of an industry track constructed prior to March 26, 1918, the practice of the connecting carrier prior to Federal control, as applied to such track of any particular industry from the beginning of its use by such industry, shall be considered as equivalent to a written contract in accordance with such practice.

No special regulations have been promulgated by the Administration to cover construction of temporary material tracks for contractors, and such facilities can be arranged for without much trouble. The first consideration is the amount of traffic involved and approximate revenue to the delivering carrier. Application for tracks of this nature should be made direct to Division Superintendents and should be followed up closely to insure prompt handling, through the various departments, for they must finally be approved in the same manner as though the track were to be permanent.

The applicant is usually required to assume the labor and other perishable elements of cost, such as grading, transportation of materials, laying track and removing same after its purpose has been served.

Leasing of waylands for industrial purposes, like the construction of side tracks, was carried on for a great many years without any uniform or standard basis, the major consideration being volume of traffic involved. Rentals as a rule were nominal, ranging from $1.00 to $5.00 per annum, until along about 1910, when the Interstate Commerce Commission broadly condemned such practices as being unduly discriminatory in favor of lessees of railroad property as against shippers who owned or leased private property, and expressed the opinion that railroad waylands should not be leased for industrial purposes except at commercial rates of rental.

Since that time all roads have readjusted their rentals and most of them now adhere very closely to a standard basis for negotiating such leases, although there is yet considerable lack of uniformity as among carriers.

The Railroad Administration exercises no jurisdiction over leases, that being purely a function of the individual corporate management.

Application should be made to local agent, or division superintendent, although in certain instances better results may be obtained by going direct to the General Freight Agent, whose approval must be had before a lease will be executed; and while the rentals usually demanded are based on commercial valuation of property, the controlling consideration in the granting of lease privileges is the volume of traffic involved, and approximate revenue to be derived therefrom by the carrier.

The Alsen Cement Co. and the Athens Shipbuilding Corporation have purchased the John B. Rose Co., of Roseton, N. Y., the bankrupt brick-making concern. The deal involves property valued at $500,000 and constitutes one of the most important real estate transactions consummated in the Hudson Valley region this year. With the purchase the new company also becomes interested in the Atlas Brick Co., of Hudson, which covers approximately 200 acres, and has a capacity of 25,000,000 to 30,000,000 bricks yearly.

Don't Want Government Railroads

Business Conference in Chicago Unanimous Against Such Ownership and Operation

THERE apparently is no diversity of opinion among business men on the question of Government ownership and operation of the railroads. At least if there be any such it was not apparent at the "Our Country First" Conference held in Chicago under the auspices of the Illinois Manufacturers' Association, and at which delegates representing nearly 40 states were present.

Many of the speakers took occasion to pay their compliments to the Railroad Administration. J. F. Zoller, for instance—he who is general counsel for the National Conference of State Manufacturers' Association—expressed the prevailing belief when he affirmed that whenever the Government has undertaken to go into business for profit the result has been that the cost of the thing done or the article produced has been excessive as compared with the doing of the same thing by private enterprise.

"It is not too much to say," he continued, "that the service we are now receiving from our Government through its operation of the railroads could have been rendered by our railroads at a lower cost to the public. This is true notwithstanding the fact that these railroads have been operated by our Government at a time when party lines have been obliterated. Therefore the continued operation by the Government in times of peace, when party lines will again be established, will undoubtedly result in higher costs than those established under war conditions."

Mr. Zoller spent some time in pointing out the weak points of the Plumb plan; he nevertheless is in favor of an early restoration of the roads to their owners on some reasonable basis, rather than waiting until some ideal method can be worked out.

But the railroad question, much as it was bound to come to the front, was merely the concrete embodiment of a bigger abstract idea to which the conference wanted to give voice. "This conference unanimously demands that these United States should forthwith return to the letter and spirit of the Constitution" were the opening words of the report of the resolutions committee; and perhaps in no fewer or better words could be given the underlying spirit of the conference. The resolution continues:

The right of private property has made America the greatest among nations; has given to her people a greater number of privately owned and occupied homes, a greater and more equitable distribution of wealth and business enterprises; more of happiness and comfort and less of poverty and suffering than any other nation in the world. Today, at the end of the most awful war the world has ever known, we find our net national wealth larger than that of all Europe combined; the increase in the cost of living less, and wages and opportunities greater, than in any other nation of the world. It is under such conditions that we condemn the frenzied efforts being made by certain radical elements of society to spread the seeds of Bolshevism, of ultra-socialism and other like doctrines among the people, all of which are destructive of the right to own and possess property, a right which has existed since the beginning of civilization, and upon which all of our institutions have had their basis and development.

This resolution was a sober and dignified statement of what several of the speakers expressed in a number of different ways. Gen. L. C. Boyle, general counsel for the National Lumber Manufacturers' Association, per-

haps drew the loudest applause when he said that we owe a debt of gratitude to the present national administration for having taught the nation beyond the peradventure of debate that the Government is not a business institution.

Mr. Zoller, as an introduction to the quotation already given, said that "political parties have never yet successfully conducted a business enterprise, if we mean by success the best service at the lowest cost."

S. T. Bledsoe, representing the Santa Fe Railway, said that while we have been fighting for liberty and democracy abroad, we have been unmindful of the forces destroying liberty and democracy at home. He believed that the railroads should be so conducted as to serve the public interest, this including as a prime necessity the determination of the amount of revenue needed to accomplish this result. He would have the rate-making power in one tribunal, preferably national, with regional departments for the administration of rates. He declared it unthinkable that transportation should cease as a result of misunderstandings between employers and employes.

With specific reference to the railroad problem the conference resolved:

We commend the zeal with which committees of Congress are seeking a solution of the transportation problem. The increasing demand for food supplies necessitates the opening of new areas of agricultural production by the extension of transportation systems. Discontinuance of terminal and other railway development has had an important effect upon the general cost of living. Resumption of railway development will tend to stabilize employment of labor especially if the country should be afflicted with depression, for experience demonstrates that railway buying always stimulates and sustains employment and general prosperity. We hail with satisfaction the evident purpose of Congress to reject government ownership of railroads or their mangement under domination by employes and to enact instead a law for the prompt re-establishment of private operation. We favor transportation developed as a government policy and urge a law prescribing that rates shall be such as to yield income sufficient to encourage such development.

And Now We Have the Sandstone Fish

Strange Relic of Past Ages Forced from Rocky Bed at Lincoln, Ill., and Put on Display

THE Lincoln Sand & Gravel Company, of Lincoln, Ill., got into the limelight recently, when a strange fish, about 23 inches long, of solid sandstone, was pumped from the bottom of the gravel pit, where it had evidently reposed under many feet of gravel for many centuries.

The force of the big centrifugal pumps of the plant had forced this unique relic of by-gone ages from its rocky bed and it aroused so much interest and curiosity that it was decided to display it in one of the local windows.

The fish evidently belonged to the pike family and had been transmuted into sandstone by the action of the waters with the sand, through many centuries of time.

The old East Sioux Falls quarry, at East Sioux Falls, Ia., has been leased by J. A. Green of Council Bluffs, Ia., and work on a limited scale will start immediately and will be gradually increased. New improvements will be introduced insuring an output of 25 to 30 carloads of crushed rock daily by spring. The municipal paving and road work planned for Minnehaha county for the next year will take the greater part of the output.

The Reliance Gravel & Sand Co., Des Moines, Ia., has filed articles of incorporation. Capital stock, $60,000. M. H. Cohen, president; other officers are, William Brech, W. B. Roberts and George Van Dyke.

Comments Upon Bonus Systems

By Daniel J. Hauer

AN interesting editorial was published in the August issue of Pit and Quarry regarding the failure of a bonus system in rewarding workmen in an eastern quarry. Few details were given but the quarryman was quoted as saying: "Since that time, it has not worked out as well as expected and we have practically abandoned any system of this kind and are paying the wages prevailing in the vicinity of our plants. I am sorry the labor situation is such, at the present time, that workmen do not appreciate any system of sharing in the results of their efforts."

There are many things to commend a bonus system of rewarding workmen, but there are also some features that are semingly against it. Those considering it should at first understand that there are many different systems or methods of arranging the bonus paid to workmen in a quarry. Because one system is not a success it does not mean that some other method of rewarding the men will not prove beneficial to both employer and employes.

It is seldom possible to inaugurate a bonus system without first educating men up to the point of desiring such a method of setting wages. To simply start a bonus system without first educating the men, means to court failure. This is especially the case when laborers are scarce and wages paid are high. With a stagnant labor market and low wages the chance of inaugurating a bonus system is materially increased.

The reasons for this should be evident. If wages are low, men are anxious to hold onto their positions, as another job may not easily be secured. With plenty of work and high wages, jobs are easily obtained and this breeds indifference upon the part of the workman as to holding a job. It would be thought natural that a man would desire to earn all the money he could in a week; but this is not necessarily true of the class of men laboring in quarries and on construction work. These men, or the majority of them, take one of two views of their earnings: One is to make as much as possible within a few days and then put in broken time for the rest of the week; the other is to earn the largest pay possible for the least effort they can get by with, even if they work fairly regular. Such men care little for any system that means that extra effort means to share in their employer's profits.

Then, too, most classes of workmen look with suspicion upon any system of rewarding them that means an uncertain wage, or that compels them to put forth greater effort in order to increase their earnings. The reasons for this are found in the history of treating employes in the past. Men have been paid piece work, or given tasks, or even offered a bonus, only to find that when they had exerted themselves and earned more money that the rates or rewards had been reduced. Changes made as to rates of pay always mean dissatisfaction unless the rates are increased. Thus men have become suspicious of their employers and most of them believe that anything in the way of a change, unless it is an increase in a straight wage, is an effort to defraud them.

It is a lesson in itself to hear workmen discuss among themselves these systems of paying men, also work hours, and the various features of handling pay rolls, boarding men, and selling them goods. Where one believes their employers to be honest

and fair in their treatment of their men, ten believe the employer is only aiming to drive them and defraud them of their honest earnings. They fear the boss and distrust him; and although they agree with him in all things to his face, yet behind his back they ridicule him, swear at him and tell of his shortcomings. The writer knows these things by actual contact with workmen.

The employer must also remember that he has a superior and trained mind as compared to that of his employes. What appears as a business proposition to him looks entirely different to his men. He must try to place himself in their position in order to see from their point of view. He must remember that the proposition must be presented to them in such a way as to overcome the suspicion that they may entertain against their employers.

In educating men up to the adoption of a bonus system of rewarding workmen it is necessary to reach their families. This can frequently be done when quarry companies own the dwellings of their workmen or the men live close to the quarry. If the wives of workmen believe that they and their families will be benefited by a change in the method of paying their husbands, they will render the employer much help in securing the adoption of the wage scale.

A bonus system must in the first place secure to the workman a minimum wage equal to that of the ordinary workman in the same line of work in that section of the country. Whether or not the laborer puts forth any special effort, or equals in his output the minimum set for the lowest wage, he must be guaranteed the usual wage.

Second, a task should not be set or a bonus offered until sufficient records have been kept and analyzed so as to determine the units of work performed by the average man for each class of work. This alone may take months to determine.

Third, when a task is once set, and the bonus for extra work named, neither the task or bonus must be changed except in favor of the workmen, otherwise he will repudiate the whole system as one to defraud him of his just earnings.

Fourth, both foremen and superintendents must also be included in the bonus rewards, as must also the office force, otherwise these employes may in some manner cause the laborers and mechanics to become dissatisfied.

Thus the education must start in the office and among the best paid men, then carried on to the laborers and then extended to their homes. The system must be so simple that the men themselves can easily figure their own earnings.

With any bonus system there must always go quality production; that is, a certain standard must be set. If crushed stone is being produced, the stone loaded from the ledge must be kept free of rotten rock and overburden, and the boulders must be small enough to go into the crushers to be broken. This means rejections of certain work, and the inspection necessary to keep all work up to the standard. Thus the cost of inspection must be considered and some method of assessing fines or penalties upon the men. Great care and diplomacy must be used in connection with these fines or else the entire bonus system may fail.

The basis of rewarding men by a bonus system is individual effort, so that there must be a recording or cost system used in connection with the wage system that shows accurate costs of each individual's work. A carload of blasted work may vary in capacity 5 or 6 cubic feet or 400 to 500 pounds; so carloads do not furnish accurate units of measurement. The writer

has seen laborers, when paid by the carload, so place the stone in the car that the weight of the load was 25 per cent less than it would be if payment had been made by the ton.

Thus for a bonus system stone must be weighed, drill holes measured, the cubic contents of ledges figured, powder weighed, oil and other supplies measured, in fact accurate knowledge must be had of all operations. These things are always the price of success.

U. S. Mineral Production in 1918

Total Output Has Value of Five and a Half Billions

THE Department of the Interior has just issued a preliminary report on the mineral production of the United States in 1918 for the purpose of making public as soon as possible the statistics collected by the U. S. Geological Survey for that year. The statistics given for most commodities are final; those for a few are only estimates based on incomplete returns; but on the whole the report gives a fairly complete record of the mineral output of the country during the year.

The total value of the minerals produced was about $5,526,000,000, more than half a billion dollars in excess of the value recorded for 1917, but the total quantity produced was less. The output of fuels was greater than in 1917, though somewhat less anthracite coal was marketed. The increase in the quantity of coal marketed was about 5 per cent, but the increase in value, due to higher prices, was more than 17 per cent. It is significant that though the increase in the quantity of petroleum marketed was only a little more than 4 per cent the increase in value was over 32 per cent.

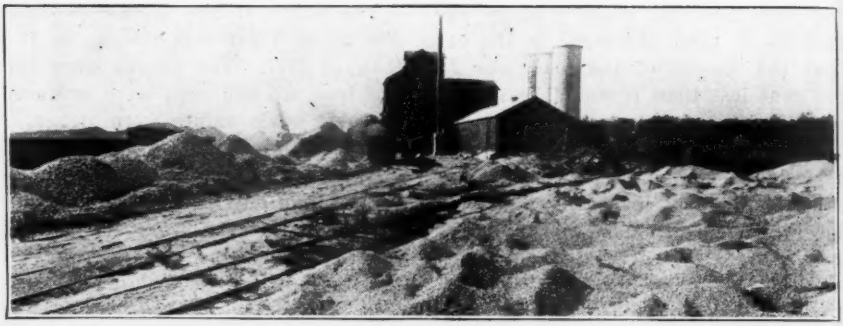
The value of the metals produced was about 3 per cent greater in 1918 than in 1917. The figures show that less iron ore and steel were produced, but here again values were higher. A little more pig iron was made, though the quantity shipped was less. Copper and zinc not only in themselves but as the components of brass are perhaps next in importance to iron in the world's industry to-day, and in 1918 they stood high on the list of war metals. A little more copper but less zinc was produced, and the values of both were lower, that of zinc falling about 25 per cent. The output of the war metals manganese and chromite, used in hardening steel, was greater than in any preceding year. Chromite increased 88 per cent in quantity and 275 per cent in value over 1917, and the increases in manganese ore were 136 and 100 per cent, respectively. Less gold and silver were mined than for many years. Though the price of silver rose from 81 cents an ounce in 1917 nearly to 97 cents in 1918, the increase was not enough to cover the increased cost of mining.

The output of building material—clay products, building stone, cement, lime, gypsum—showed a great decline.

The domestic production of potash in 1918 was 54,000 tons, an increase of 68 per cent over the output in 1917.

A copy of the report may be obtained by application to the Director, U. S. Geological Survey, Washington, D. C.

The Wilson Sand & Supply Co., Huntington, West Va., owing to increased business has been obliged to double the capacity of its plant. Improvements now underway are the company's own drydocks, a new derrick and dredge boat, a cable system and elevator to facilitate loading and the addition of ten new barges, while five more are now in process of construction.



New Plant for Producing Agricultural Limestone is the Building Nearest the Observer

This Company Sees Possibilities in Agricultural Limestone

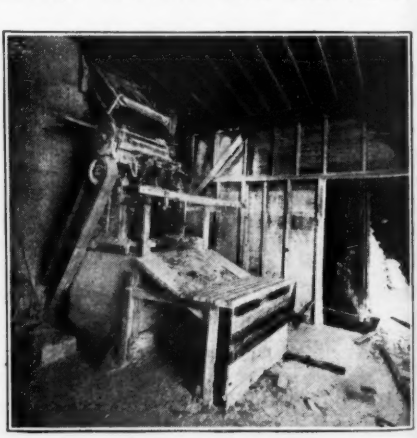
ONE of the companies most recently to go into the business of producing ground limestone for agricultural purposes is the A. C. O'Laughlin Company of Chicago, whose plant for turning out this product has just been put into operation.

This company has a large crushing plant near Bellwood, Ill., a few miles west of the Chicago city limits, and well located on four railroads, where it has been producing ordinary commercial crushed stone for a dozen years or more, having for this purpose an immense quarry, as can be judged from a partial view of it in one of the illustrations shown herewith.

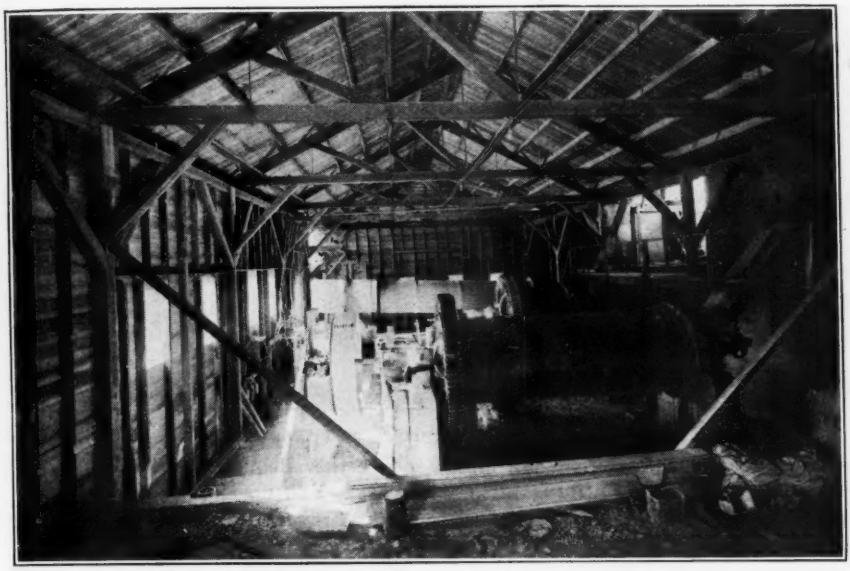
The officials of this company have watched with considerable interest the growing demand for a fine ground pulverized limestone for agricultural purposes, due to the continued investigations made by soil experts showing this to be one of the most efficient and economical methods of keeping up the fertility of the soil. They have especially laid emphasis on fine grinding at this plant, believing that this is justified by the quicker and more direct results which a finely ground product secures.

As a means of keeping up plant operation and shipment, and thus reducing overhead costs, this has also appealed to them because of the fact that a kiln-dried product, such as they are turning out, can be shipped in winter as well as any other time, so that an all-the-year business can be approximated.

The quarry equipment of the older plant includes two large steam shovels and two Davenport locomotives, with a full complement of cars, delivering up an incline to the crusher house, where five Gates crushers of



Bates Bagging Machine

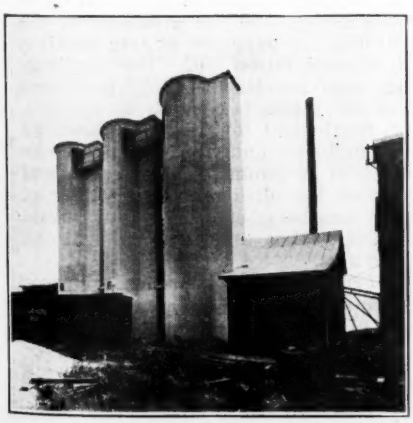


Interior of Drying and Pulverizing Room

various sizes reduce it to the ordinary commercial sizes for concrete construction, macadam, etc.

To this has now been added the new part of the plant, shown most prominently in the illustrations, where the process of crushing is continued until an agricultural fertilizer is produced.

The most noticeable feature of this part of the plant as it stands forth on the landscape is the battery of three concrete tanks which are used for the storage of this material in its various stages. These tanks are 14 feet in diameter and 60 feet high, and are entirely of reinforced concrete, including the roofs. They have hoppered bottoms to facilitate the flow of materials.



Three Concrete Tanks

The handling of the materials is entirely automatic throughout. The stone comes by means of a pan conveyor from one of the crushers in the crusher house, reduced to a size of about ¼ inch, and is delivered to the hopper of the dryer. The feed end of the dryer extends beyond the side of the building for this purpose. The dryer is of the Allis-Chalmers type, 6 feet in diameter and 50 feet in length, with a capacity of from 15 to 30 tons per hour, varying, of course, with the amount of moisture in the material to be driven off. The dryer is fired with mine-run Illinois coal.

From the dryer the material falls into a hopper from which it is carried by a bucket conveyor to the first of the series of concrete tanks. From this it is fed by gravity to the first

General View of Quarry and Plant

of the pulverizers, a 6x6 foot ball mill of 30 tons per hour capacity. This reduces the stone to a fineness of 90 per cent through a 100 mesh sieve, the product of this machine going automatically to the second tank by means of a screw conveyor and bucket elevator. From here much of it is sent out for agricultural use, this grade being shipped by bulk in box cars. From this tank also the stone can be drawn into the 5x20 foot tube mill for still finer grinding. Here it is reduced to a fineness of about 90 per cent through a 200-mesh screen. This product goes to the third tank, from which it is drawn off into the hopper of a double Bates bagging machine, packed in valve bags and delivered to box cars located on the track just outside the door.

Electricity is used for power throughout the plant. All machines are equipped with individual Allis-Chalmers motors.

The Cummins Bill

IN discussing the problem of railroad legislation, the *Traffic World* makes the following comment: The solution is a measure that will assure adequate revenue—and no more—to the carriers; that will assure a fair wage—and no more—to the railroad employe; and that will assure the adequate service for which he pays—and no more—to the shipper or the traveler." All will agree, no doubt, that such a solution of the problem would be most satisfactory, but how to accomplish these results is another question.

After prolonged hearings, the Cummins Bill has been introduced in the Senate as the plan favored by the Senate Committee on Interstate Commerce. A digest of the important features of this bill follows:

1. The return of the railroads to private ownership, but with the understanding that their operation is to be strictly supervised by a federal board of transportation, created for that purpose.
2. Division of the country into several districts and the grouping of the railroads for purposes of rate making.
3. Consolidation of the railway lines into not less than 20 nor more than 35 distinct competing systems.
4. Settlement of disputes between the employes and the companies by means of a committee on wages and working conditions, consisting of eight members, of whom four would represent labor and four the railroad companies.
5. Prohibition of railroad strikes or lockouts, with drastic penalties for any attempt to obstruct interstate commerce by such means.
6. Division of profits in excess of a fair return on the value of the property into two equal shares, one to be used in bettering working conditions, and the other in improving service.

Friction Surface Belt in Cement Plant

BY RALPH W BARNES
With Goodyear Tire and Rubber Company

MANY times, the question has been brought up by the different cement plant operators over the country, whether a rubber friction surface belt, was ideal for cement plants. Before this question can be intelligently answered, consideration must be given to the construction of the belt and the duty it is called upon to perform.

Friction surface belts differ from the ordinary canvass rubber covered belts, inasmuch as the rubber is pressed into the meshes of the fabric under extremely high pressure, insuring a complete covering for every thread. This also binds the plies together and tends to make the belt unified.

Opportunity is afforded in the construction of friction surface belts to reduce the stretch to a minimum when cured in the press.

Due to the waterproof construction and the elimination of stretch during the manufacture of these belts, very little trouble has ever been encountered by having to "cut out."

These qualities are quite marked and enjoy a long interrupted service in many plants.

The sketch shows an installation of a Goodyear friction surfaced belt installed as a result of a plant analysis by one of the Goodyear technical men, at the plant of the Edison Portland Cement Company.

The belt is installed on an Edison Giant Roll from engine drive shaft. Due to the nature of this drive, both sides of the belt were constantly in contact with the pulleys. Severe flexing of the belt on this drive necessitated a belt which is limber, will conform to the shape of the pulleys readily, and has a tensile strength sufficient to carry the load.

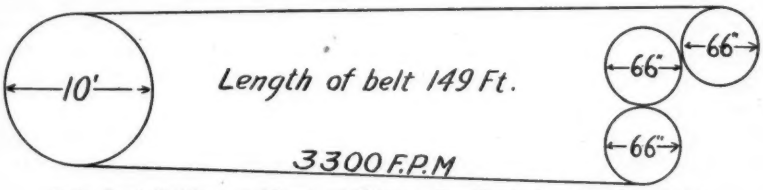
The service which this belt is called upon to do is quite severe. Every operator knows the exact duty of the roll, and knowing its intermittent service will not hesitate to say that it is a hard drive.

The horse power required on this drive is about 300. Material to be crushed is very hard limestone.

The belt must withstand the action of dust and falling pieces of rock, which is thrown from the crusher between the belt and the pulley.

Only one "take up" has had to be made since its installation on August 15, 1918, and is still in service at the present time.

Belt applied was a Goodyear Blue Streak, 28-inch width, 7-ply, 149 feet long. There is a 45 degree angle of incline from an overhead drive. The belt was fastened with a Vim splice.



Belt Installation at Plant of Edison Portland Cement Company

Handy to Have

An electric hoist or electric monorail trolley is a most convenient piece of equipment to have in a plant for handling heavy machinery, making repairs, handling material, etc. A number of varieties of such hoists are shown in Catalogue No. 18 of the Euclid Crain & Hoist Co., Euclid, Ohio, a copy of which will be sent by the company on request.

Hazards of the Cement Stock House and Packing and Loading Department

A Paper Delivered at the Eighth Annual Safety Congress of the National Safety Council

BY FRANK FRAME

Secretary, Central Safety Committee, Alpha Portland Cement Company, Easton, Pa.

A STUDY of the causes of personal injuries in connection with cement manufacturing will disclose that the screw conveyor and sliding materials are always among the leading hazards. The Stock House and Packing Departments, having such a large proportion of these risks together with other dangers, are worthy of careful consideration.

Taking the experience of the Alpha Company at eight stock houses and six packing rooms, during a period from January 1, 1918, through July 31, 1919, they furnished about 8 per cent of the total injured, the same percentage as to total days lost, and the only fatality on our records during the years of 1917 and 1918. Half of the men injured were compelled to go off duty. This runs close to the general average.

Binman's Fatal Accident

With reference to the fatal accident, the employe (a foreigner) had been in our service over two years and was following his regular occupation as binman in a small stock house in which the cement was stored on the bin plan. The employe was directed to do his work in Bins No. 5 and No. 6, each one having a capacity of 4,800 barrels. This certain afternoon there remained 400 barrels in each bin which had to be hoed in feeding the cement to the screw conveyor. After loading one car of cement the foreman failed to receive an answer to his signal and upon investigation found that the deceased instead of working in Bins No. 5 and No. 6, had gone over to Bin No. 3, where he could secure the required cement with far less real work on his part as compared with the hoeing he would have to do in the former bins. His portable light he left hanging in Bin No. 5. Working on a contract basis we think caused him to change from an almost empty bin to a full bin where he could have less wearisome working conditions, and his further neglect to afford himself ample light contributed to the recklessness resulting in his death.

Hazards of Stock Houses

Cement stored in bins presents greater danger to the workmen during the course of its removal than is usually found in the open house.

At Martins Creek we have two types of stock houses. No. 1 has been partitioned off into bins where a known quantity of cement can be stored for special orders, tested and sealed, and to be drawn during the presence of the inspector who is sent to the plant to see that the cement in his shipment comes from this particular bin.

No. 2 Stock House is 270 feet long, 73 feet wide, and the walls are 39 feet, 6 inches high. The capacity is 185,000 barrels. There are no bins such as described in Stock House No. 1, the cement being discharged at different points from the overhead screw conveyor and left to follow its natural course as it strikes below. This has been termed as "Open Stock House."

The storage bin has a limited capacity and while being emptied the cement tends to cling to the surface of the partitions and, therefore, gives the working face a steep pitch. When the cement is being disturbed to

cause a flow, the workman must be on his guard in event of abrupt and heavy slides of material, which are very often the rule. The space in which the man can safely do this work is limited; the bin may not have adequate natural or artificial lighting, the flow of cement creates a continuous dust, the man will have his entire lower limbs wrapped up with cement sacks that retard quick movements — all of which increase the chances of injury. In case a man is covered up by cement it takes only a few moments for him to smother to death.

In an open stock house having tunnels the conveyors in which are fed by spouts and arranged at short distances apart, the cement that does not flow to the opening freely will remain in small low piles in the stock house. Men have plenty of room, more light, and better ventilation during the course of hoeing the cement.

When walking over the top of cement in an open stock house during the course of taking an inventory, care must be exercised against starting a slide. At one of our plants a finishing mill foreman, appreciating this danger, has been known to follow the chemist in the course of this inventory without the knowledge of the latter, so that he might be close at hand in case of accident.

Sometimes we find a small leak in the stock house roof or sidewalls, through which moisture will penetrate and reach the cement when the storage is well filled. In cleaning the last cement from the stock house, there is a danger from any cement which has hardened sufficiently to hold fast to roof supports, to other overhead construction, and to the sidewalls. At Plant No. 6 a formation which was clinging to the eave of roof fell and struck the binman across the back, causing a disability of 70 days' duration. Another man was injured in removing hard cement from the stock house sidewall.

In 1914 the Association received a report of a man being killed by a slide of cement caused by jar from the railroad. This brings to mind another source—the deep-well blast in the quarry. Every man should be ordered from the stock house during such blasting. Our experience shows that slides are induced by the accompanying jar. Particular care should be observed when working in freshly-ground cement, as it is known to move quickly and in heavy slides upon disturbance.

During the course of the removal of cement, the safe practice is to work not less than two men at any one time; to furnish a long rod and long handled hoe to start the cement, ropes where conditions permit their use, and careful instruction to men as to the danger should they undercut the cement to induce slides, together with a rule that hoeing should be begun from the top of the pile and the cement worked on the terrace plan. Compressed air is a good agency to start a flow of cement from a bin. The floor of the stock house between the tunnels, when constructed on an angle, will induce a greater free flow of cement.

Drawing cement in tunnels by reason of the limited ventilation is a dusty occupation and there are numerous cases of cement getting into the eyes. We have the conveyors in the tunnels of one stock house set in a concrete trough which is built up from the floor and one one side of the tunnel so that the attendant cannot walk over the conveyor gratings. This gives room for thorough inspection, and is convenient in case of repairs. Where artificial light is required, due care should be given to keeping the system in good service.

All bins need strong iron ladders.

These should be guarded, and connected with the ladder at different heights in the bin there should be working platforms protected by guard rails and toe board. This construction will give the workman a chance to go about his work more freely, and affords better safety. We had an employe who lost 49 days when, to avoid a slide, he jumped on a wooden ladder with such force that he broke the wooden rungs and fell into the cement. Last year a report was furnished the Association of a fatality due to the bin collapsing. In this connection the construction of bins must allow for a liberal factor of safety. At one of our stock houses, iron columns in between which were inserted wooden planks were found inadequate, as the columns buckled and broke loose at the top fastening. An all-steel bin designed by the construction company's own engineer proved a failure in a near-by plant. When wooden partitions are used a liberal use of iron supports and a frequent inspection is advisable. Reinforced concrete makes very strong bin partitions. Since 1910 we have had them in one of our stock houses, built of 8-inch walls, 17 feet by 30 feet, for a bin of 3,000-barrel capacity.

Recent storage construction shows the silo method of reinforced concrete to be in favor. Single containers, built high and narrow so as to promote self emptying, with port holes through which to reach from the outside to disturb any cement that clings to the side walls, would remove many of our present hazards. In addition the tunnels connecting these single containers would permit all necessary openings direct to the outer air to secure good ventilation, better light, easy access, and a general improvement in present working places.

The dangers of a screw conveyor are too well known to require a lengthy review. They are like poison gas in effect, causing death or permanent injury. Long ago the screw conveyor was indicted, found guilty, and sentenced for life behind strong iron bars, made up in form of a heavy grating ¾-inch rods spaced at $2\frac{7}{16}$-inch centers, secured to angles —3 in. by 2½ in. by ¼ in.—placed legs down, in sections 11 ft. 9 in. long and bolted securely in place. This guard is your gas mask, and we must insist on the same recognition of its value by keeping it in place, as all soldiers who were compelled to have their masks on their chests ready for instant use. Many casualties in the late war were due to soldiers not having gas masks for immediate protection, and the cement industry can point to a long list of amputated limbs and fatalities caused by the lack of appreciation of the awful dangers of screw conveyors and the necessity for the best guards and inspection service to overcome this menace in every department and in every location in the plant.

To eliminate further danger and dust, a ¼-inch thick plate, the full width of the conveyor and covering the entire length, excepting such places where material is inserted, is added. The plate is fastened with bolts to the grating angles.

Hazards of Packing and Loading

In the packing room, the Bates machines need guards on the main drive belt, the gears, the pulleys on the bin feeder drive, and the eccentrics in back of machine. Our records show one man lost two fingers in the gears and another had a close call from fatal injuries by having his clothing caught on small feeder drive pulley which had a piece broken from flange. Twenty per cent of our accidents in the packing room and stock house are due to cement spurting into the face and eyes of the operator on Bates machines, due to a bag bursting or a small hole in same. Only a small

percentage of our employes will wear goggles.

I have been advised that a member company follows a practice of having a small equipment at the stock house for giving immediate treatment—only an eye wash—as soon as a man gets cement in his eye, claiming that if the chemical action of the cement is neutralized immediately, the usual burn will be prevented. They have now followed this method about eight months and during that time have not lost one single day from a cement in the eye accident.

On hot days in packing freshly-ground cement, the men often experience chafing of the arm and fingers. Our experience has been that there is a good deal of lost time on this account and the extent of this disability may escape attention because the ailment is not classed as an accident and, therefore, the same complete reports of the full facts are not received and kept on file. The decisions under compensation laws have been so liberal to the claimants that we may expect to be required to pay compensation for a serious infection or death resulting from this cause. We hope the medical department of some member company can offer an ointment that is quick healing and antiseptic, to be kept on hand for immediate use in case of chafing and the men educated to obtain prompt treatment, as a means to reduce this lost time.

The question of dust control in the packing room is in the mind of every manufacturer. State factory inspectors have registered a criticism on working conditions, and who knows how much longer the workman will tolerate them.

The Security Lime and Cement Company is reported as having secured good results with an installation of the Bates Valve Bag Company which produces a draft and collects the dust so successfully that the air in this department of the Security's plant is practically free from cement dust. The Alpha Company is about ready to try out a collecting system, recently designed.

Trucking has its hazards in men striking their hands, slipping on the floor, upsets, and when passing over the runway. New men need instruction as to proper methods in handling a truck.

The shifting of cars at packing rooms has its dangers. Failure to give the workmen proper notice before the shift is started, neglect of the men to heed the warnings, cars breaking loose, men crossing in front of and jumping on cars, are responsible for accidents. At one plant where the tracks to packing room are on a grade, we have derailers and the crew must give the packing room full notice of a shift about to be made before the cars can pass the derailer.

The stock bins and overhead walks require the standard guard rails with toe boards. A fatal injury on our record shows that while engaged in conveyor repairs over the bin a bar slipped and caused the man to fall from the platform on top of bin. The same standard guards that are generally used in other departments of the plant will afford necessary protection to belts, pulleys, gears, sprockets, chains, clutches, and electric apparatus which make up the general machinery hazards. Care should be exercised to see that machinery, particularly that in tunnels and elevators, is equipped with locks to prevent starting up without notice while men are working in positions where they can be caught.

The Dean & Brown rock quarry on Coos river, Ore., announce a minimum wage of $5.00 per day, a raise of 50 cents daily, which has been made necessary by reason of the lack of labor.

Encouraging Situation in East

New Companies Being Organized in Several Sections to Take Care of Increasing Business

THE business situation in the sand, gravel and crushed stone industries in the eastern districts is decidedly encouraging. There is a good, healthy undertone to trade and every evidence of constant increase in call as the days go by. New York dealers report a strong demand for materials with prices holding firm at present levels, while throughout this section, New Jersey and New York there is a fine call for crushed stone for road operations. Good quality, 1½-inch gravel is now selling at New York for $2.00 a cubic yard in carload lots, while ¾-inch material is selling at a like figure. These prices are about the same as those in force for the past year, and there has been but slight fluctuation. Dealers are asking $3.00 and $3.25 for good washed gravel per yard, delivered on the job in this section. Building sand is selling for $1.25 a cubic yard in carload lots, with dealers asking about $2.25, delivered on the job. Crushed stone is holding well at prices established for some time past, these being from $1.65 to $1.75 for 1½-inch stock, and $1.75 to $1.85 for ¾-inch, per cubic yard in carload lots.

The activity in the sand and gravel business in New York is reflected in the volume of new companies now being organized to engage in this industry. At Williamsville, the Daigler Sand & Gravel Co. has been organized with a capital of $50,000 by Frank G. Bishop and Samuel J. Russel. The Marlboro Sand & Gravel Co., New York, has been formed with a capital of $500,000 to operate in the Catskill section, with M. H. Reiss, Harold R. Every and J. M. Kittrell heading the organization. The Benedict Stone Corporation, New York, has been organized with an operating capital of $300,000 to engage in the crushed stone industry at Tuckahoe, New York; W. E. Wicks, E. C. Van Dyke and J. C. Benedict, 133 West Forty-second Street, New York, head of the company. The property of the Rockland & Rockport Lime Co., comprising about 4½ acres at Newton Creek, L. I., comprising wharf, bulkhead, buildings, etc., is now being offered for sale.

Things are active in the industry in the Buffalo section. The Buffalo Gravel Corporation, Buffalo, has increased its capital from $250,000 to $300,000 to provide for proposed general expansion. At Gouverneur, N. Y., the Hygrade Limestone Corporation, recently formed, is arranging for extensive development work of quarries in this section, and will install considerable machinery and equipment to carry out proposed plans. This company is headed by Fred J. Porter, Frank H. Porter and E. D. Porter, all of Gouverneur, and R. P. M. Davis, Harrisburg, Pa.

Pennsylvania, one of the important states in the east in the sand, gravel and crushed stone industries, is showing particular activity at the present time. Leading companies in different parts of the state report business as being very good at the present time, with outlook decidedly encouraging. Emanuel & Co., 719 Hamilton Street, Allentown, Pa., with crushing plants at Easton and Catasauqua, has filed notice of change of name to the Emanuel Slag Co. The company is specializing in the production of a trap slag for road construction work, and is making good sized shipments to different Pennsylvania and New Jersey points; a fine material is also being produced for use as an aggregate in concrete work. C. K. Williams is vice-

president and treasurer. In this same district, the Greenwich Manufacturing Co. has been organized with a capital of $60,000, to operate a quarrying, crushing and grinding plant at Catasauqua, which will be the headquarters of the company; Edwin Thomas, of this place, heads the organization, and J. Willard Paff, Easton, is interested with Mr. Thomas.

In the Pittsburgh district of Pennsylvania, the Allegheny River sand and gravel companies are busy and view the outlook with favor. The Keystone Sand Co. is doing considerable in connection with road construction, and furnishing large quantities of material for use in Western Pennsylvania. The J. K. Davidson & Brother Sand Co. is another active concern, and has a number of sand diggers working at capacity at Harmarville and other points on the river. The Rodgers Sand Co. has secured a large contract for work in connection with the now electric power plant of the Cheswick Power Co. at Cheswick.

L. R.

With the Louisville Trade

Big Road-Building Program in Kentucky Will Use Large Quantities of Materials

WHILE the crushed stone business is slow for the time being the prospects ahead are very bright, for Kentucky is making preparation to spend about 3½ million dollars in road building while Indiana has let contract for Federal Aid road work to the amount of $4,739,139 and has plans outlined involving a total of 12 millions. So generally those owning quarries and crusher plants are putting their equipment in order and some are putting in new equipment in preparation for the busy times ahead.

R. B. Tyler, of the Tyler Stone Co., says that it looks good ahead but crushed stone is quiet right now and they are temporarily closed down, partly because of the cessation of work at Camp Knox where they had some contracts. He feels pretty certain this work will be carried out yet, but no one knows just when. Some think it will be done this fall while others feel that not much will be done until spring.

J. T. Duffy, of the Ohio River Sand Co., which is the dominant concern here in the sand and gravel business, says the trade has been going very well with them considering the situation all around. The volume of business is not as large as in some years but it is doing very well, in the country trade, especially. They are a bit apprehensive that the steel strike may lead to some curtailment of building and thus temporarily reduce the demand for sand and gravel.

Their sand and gravel all comes from the Ohio River and the length of the digging season is determined by the weather and not the stage of the river. In other words, they work up until cold weather and ice interfere with operations, and make it a practice to accumulate stock in their extensive yards which will carry them through until spring. They have a splendid stock on hand now and are prepared to take care of any kind of demand for either sand or gravel.

J. T.

The Daigler Sand & Gravel Co., Williamsville, N. Y., has been incorporated by S. J. Russell, Frank G. Bishop, Edward H. Haist and Geo. W. Nottey, who have taken possession of the property recently purchased from Adam Daigler on Cayuga Road. New machinery is now being installed.

Pit and Quarry

Rand-McNally Bldg., Chicago, Ill.
Published Monthly

HARRY W. BAUMGARTNER
Publisher
V. E. LARSEN, Manager

E. S. HANSON, Editor
D. J. HAUER, Associate Editor

Getting a Side-Track

THE review in this issue by Mr. Ben Stone, giving the rulings at present in force in regard to securing industrial side-tracks, will be found particularly timely. Many of our readers are aware from costly and annoying experience that it is not as easy to get a side-track as it used to be; and others will learn of it from Mr. Stone's article.

But this is but one of the inconveniences of dealing with the railways under government administration.. A case in point is that of an Iowa sand and gravel producer who was about to put in a new plant. His relations with the railroad had always been very satisfactory and it was merely a matter of calling on the proper official and explaining the need of the side-track, the probable amount of business which would go out over it, etc.

Just at that time along came the government and took over the control of the railroad; and then when the sand and gravel operator began to inquire about his side-track he was asked where his contract was. Of course he had nothing but a verbal understanding, which did not "go" with the railroad administration. So he was told that he would have to put in the track at his own expense.

This he did; but it was necessary to make application to the railroad administration before the track could be connected with the main line. This application had to go to Washington and pass through numerous official channels, so that it was just three months from the time the application was made before the permit came back.

In the meantime building materials and equipment of all kinds had been arriving, having been ordered on the supposition that they could be carried to the site of the plant over the side-track. With no connection, however, all this stuff had to be thrown off in the railroad yards and hauled out to the plant as best it might.

The track is connected now and is serving to ship out sand and gravel; but as a means for facilitating the construction of the plant it proved a dismal failure.

Stating Source of Materials

IT is urged by some producers that better results would be obtained, especially on road work, and better conditions be brought about in the industry if the contractor, in submitting an estimate, were required to state what source of supply he expects to get his materials from.

If it is not a deposit which is already well known it can then be investigated and approved or disapproved as the nature of the material and its method of handling seem to warrant.

A great many misunderstandings, and the rejection of a considerable amount of material, might be avoided in this way, especially if care is taken to see that the contractor actually does get his materials from the source which he indicates in his bid; as the producer of the best material is often placed at a disadvantage because, while the estimate is based on the best grade of material—the kind which he is producing—the contractor is

often able to substitute an inferior grade at lower prices and "get away with it."

The Illinois Sand and Gravel Producers Association in a recent bulletin suggests the possibility of producers having material inspected at the plant. Regarding this matter, it states:

Rejection of material by the State Highway Department is a matter of grave concern to producers. In a number of instances highway officials have intimated that producers willfully disregard specifications. Producers, on the other hand, are generally of the opinion that cars are not properly sampled. In most instances, material rejected on basis of sampling test has been accepted where shipper insisted that it be unloaded on the ground. This would seem to indicate that there is some fault with the methods used for taking samples. It has been suggested that a closer cooperation between the Highway Department and material producer might bring about a better understanding; but the real remedy, we believe, is that producers insist on having material inspected at the plant.

The Transportation Outlook

WHILE in the main quarrymen and other heavy shippers are looking toward the doings of the railroads and worrying over the prospects of insufficient equipment and possible higher rates, there is another factor entering into the transportation situation which may cut a larger figure. This other factor is the motor truck.

The motor truck has not only made a place for itself in what is termed local delivery work for sand and gravel and crushed stone, but gradually and steadily it is enlarging the territory covered until the present prospects point strongly toward the motor truck dominating the matter of transportation up to a distance of 50 miles or less. And this is beginning to apply to stone products and to brick and similar heavy material as well as to general merchandise.

In fact, the outlook at present is that the motor truck may relieve the railroads of so much short haul business that the whole idea of transportation will have been revised so far as the railroads are concerned. Meantime this will tend to localize trade in home territory where transportation is controlled by the plant owners through their trucks, which in the final analysis will probably prove to be the best solution of the whole problem.

Says Price Peak Has Been Reached

PRICES have struck their high mark, according to Allen E. Beals, of the Dow Building Reports, New York. He says:

It is generally conceded by practically every building material department that the peak had been reached for the moment in all basic building materals so far as present supplies were concerned and that future price advances in building materials would be governed entirely by the ability of the President to bring about a reduction in the cost of living so as to keep wages to both skilled and unskilled labor stable at centers of building material manufacture as well as at points of building construction. Present building material prices are based upon wage scales either now in force or to become operative before the labor conference meets in Washington. They will not, under any circumstance, however, go lower than present levels either this year or next year, because stocks in hand to-day will largely enter into next year's building work. What next year's producing costs will be cannot at this time be foretold, but it is certain that they will reflect the new wage scale accorded to labor under the agreements accepted in the final adjustment of present labor disputes or the adjustments that will result from the failure of the Administration to cut the cost of living.

You Are Entitled to Cars!

THE Railroad Administration has put itself on record as playing no favorites in the matter of the distribution of open-top cars, except that cars of low capacity will preferably be allocated to other uses than the carrying of coal. The ruling which is now in effect was sent out September 12th to all regional directors by W. C. Kendall, Director of the Car Service Section of the United States Railroad Administration. It is as follows:

The movement of road building materials has reached such proportions and complaints received here indicate such divergence of policies maintained by various railroads, that we feel the necessity of outlining our general policy in the matter. It has been decided that we must accord road materials and all other commodities requiring open top car service, their fair share of such equipment, giving preference in non-coal service to the low capacity open top cars, but when such cars are not available in sufficient numbers, the higher capacity open top cars should be provided. This is substantially the policy required in accordance with the recent statement of the Director General to the Senate Committee.

This should dispose of the matter so far as the distribution of cars is concerned, and any producer who feels that preference is being given in his locality to coal or any other industry has a right to complain.

It is worth while to note in passing that the various state and national associations representing pit and quarry products were instrumental in getting this statement from the Director of the Car Service Section. Prior to this time a decided preference was being given to coal operators in the distribution of cars. It must be borne in mind that non-coal producing industries are entitled to their full share of equipment whether the cars available are of low capacity or of standard type.

With reference to the entire car situation a statement sent out by the Lime Association is also of interest. It reads as follows:

The Car Service Section of the Railroad Administration occupies an office adjoining the Intensive Loading Section. This fact is one of greatest consequence to manufacturers who seek assistance in the matter of their car supply.

Those who have been neglectful of the efforts of the Railroad Administration to encourage maximum loading of cars suffer a severe handicap when it comes to interesting the Car Service Section in furnishing the cars they need. There is the closest co-operation between these two offices of the Railroad Administration and every shipper who asks for help is promptly investigated to ascertain what his custom has been in the matter of maximum loading.

The general rule of the Railroad Administration at present is to furnish not to exceed 70 per cent of the cars actually needed by shippers; and if manufacturers who are suffering because of the car shortage are securing 70 per cent of their requirements of cars it will be useless for them to seek a more liberal supply through the Railroad Administration office in Washington. Those whose supply is less than 70 per cent of their demands have a good case and can secure relief upon submitting a statement showing their daily requisitions upon the railroads, the number of cars supplied daily in response to their requisitions, and the number of cars loaded out each day. A general statement that they are short of cars is useless as a basis of action here in Washington and the head of the Car Service Section cannot and will not act with the Regional Directors of the Railroad Administration unless definite figures are submitted showing the exact situation in respect to the demand for cars and those supplied by days as suggested before, for a period beginning at least two weeks prior to the date of the request for assistance.

Much valuable time can be saved by manufacturers who are suffering for cars if this suggestion will be borne in mind and acted on.

The Beaver Portland Cement Co., of Portland, Ore., has reduced its common stock from $600,000 to $480,000.

ASSOCIATION ACTIVITIES

Is It a Barrel?

Question Comes Up With Reference to Air-Tight Container for Lime

DURING the past month an extended conference took place at the offices of the Lime Association at which the Bureau of Standards was represented as well as one of the manufacturers of air-tight containers.

The Bureau of Standards is of the opinion that the air-tight container falls under the description "Barrel" as contained in the Standard Lime Barrel Law, and the suggestion was made that in order to permit the use of the air-tight container without violating the law, it be made in a sufficient number of sizes so that 180 pounds of lump lime, regardless of its specific gravity, can be contained in one or the other of the standard sizes and that a larger sized container be made to accomodate this weight of hydrated lime for those who desire to ship hydrate in barrels.

The attitude of the Bureau of Standards is to encourage by every possible means the use of this new type of container provided the industry desires to use it. It is obvious that the industry does desire to use it because already orders have been placed by many manufacturers for large numbers of these containers.

Comments are invited by the Lime Association upon the above suggestion as to a workable and satisfactory means of bringing this new type of container within the meaning of the Standard Lime Barrel Law. It seems from all the information at hand, that it is perfectly feasible to use the steel barrel without violating the law, and that no amendment is necessary to accomplish this.

Get Together With Road Commission

Indiana Sand and Gravel Association Has Conference on Aggregates with State Representatives

SPECIFICATIONS for sand and gravel on road work were discussed at a conference in Indianapolis on Sept. 4, called by the Indiana Sand and Gravel Producers Association, and at which representatives of the State Highway Commission were present.

Mr. L. H. Wright, Director, Indiana State Highway Commission, who has always been held in highest esteem by the sand and gravel producers because of his geniality and honesty of purpose as a good roads booster, made a short talk following the luncheon. He solicited the co-operation of the association in every way possible in carrying out the road building program of the commission to the end that Indiana might have the best roads of any state in the Union. He also urged the support of the association in preventing the dissolution of the present commission, the law creating which has recently been attacked in the lower courts.

Mr. H. K. Bishop, chief engineer of the commission, won the admiration of the men present at the meeting by his frank and fair statements regarding the policy to be pursued by his department with reference to the selection of materials for road building

purposes. He demonstrated the wisdom of using aggregates of the highest quality that can be secured from the deposits of the state and especially urged the importance of proper gradation. Mr. Bishop expressed his willingness and desire to co-operate with the association in drawing suitable and reasonable specifications for the use of sand and gravel in road construction work. A committee was appointed to confer with Mr. Bishop in this respect, consisting of Messrs. Yeoman, Nattkemper, Carmichael, Theobald, Frazer and Miller, the president and secretary of the association being ex-officio members.

Mr. J. M. Kimmel, chief inspector for the County Unit work, pointed out that some producers of sand and gravel are not turning out aggregates that will meet the gradation prescribed by many of the county specifications, which the State Highway Commission had no part in drawing and has no power to change or interpret differently than written.

It was the unanimous opinion that the work as outlined by the officers of the association should be carried to conclusion, and in order that the proposed activities might not be hindered for lack of funds, the members present agreed to make advance remittances.

William A. Campbell, Havana, Cuba, has recently been supplied a complete crushing plant by the Traylor Engineering and Manufacturing Co., Allentown, Pa. This consists of a No. 6 standard gyratory crusher, a No. 6 continuous bucket elevator, and a 48"x16' heavy duty revolving screen.

The Lincoln Sand & Gravel Co., of Lincoln, Ill., is now occupying its new plant, south of the town, where the capacity is now more than fifty carloads a day and this is contracted for for some time ahead. There is a possibility of further enlargement of the plant in the near future.

Promotional Activities Outlined

Executive Committee of Sand and Gravel Association Recommends Twelve Lines of Work

AT a meeting of the executive committee of the National Association Sand and Gravel Producers held in Chicago on August 14 and 15, consideration was given to recommendations made by the business manager having to do with the present and future work of the National Association and for bringing the members in closer touch with the work that is being carried on and with the results that are being accomplished.

It was decided that the program of the Association for the present should include the following subjects and activities to which attention should be directed in such degree as might be warranted by their relative importance to the welfare of the industry:

1. *Transportation:*
   (a) Freight Rates.
   (b) Car Supply.
   (c) Traffic Rules.
   (d) Pending Legislation.
2. *Extension of the Use of Sand and Gravel:*
   (a) Testing and Experimentation.
   (b) Specifications.
   (c) Standardization.
   (d) Education.
3. *Co-operation with Governmental Agencies:*
   (a) Department of Labor.
   (b) Bureau of Public Roads.
   (c) Bureau of Standards.
   (d) Geological Survey.
   (e) Bureau of Mines.
4. *Co-operation with National Associations:*
   (a) American Society for Testing Materials.
   (b) American Concrete Institute.
   (c) American Association of State Highway Officials.

(d) Various National Associations representing: Engineers, Architects, Contractors, Highway Development, Producers of Other Building Materials.

5. *Industrial Relations.*
6. *Insurance.*
7. *Cost Accounting.*
8. *Business Methods and Practices.*
9. *Federal Legislation.*
10. *Statistics.*
11. *Organization of State Associations.*
12. *Publicity.*

It will be understood that the foregoing outline does not attempt to cover the many ramifications that will be made apparent as each subject is developed and worked out in detail.

In order to handle properly the problems and questions involved in the program of activities as outlined, it is deemed essential that as soon as possible the following departrents be created and placed in charge of competent men:

1. *Engineering Department.*
2. *Publicity Department.*
3. *Trafic Department.*
4. *Legal Department.*

In accordance with the provisions of the Constitution and as a further means of bringing the producers in more intimate relation with the Association, the United States has been divided into ten districts as follows:

District 1 — Connecticut, Maine, New Hampshire, Massachusetts, Rhode Island, Vermont.

District 2.—Delaware, New Jersey, New York, Pennsylvania.

District 3—District of Columbia, Maryland, Virginia, West Virginia.

District 4—Florida, Georgia, North Carolina, South Carolina.

District 5 — Alabama, Arkansas, Louisiana, Mississippi, Tennessee, Texas.

District 6—Illinois, Indiana, Kentucky, Michigan, Ohio, Wisconsin.

District 7—Iowa, Kansas, Missouri, Nebraska, Oklahoma.

District 8 — Minnesota, Montana, North Dakota, South Dakota.

District 9—Arizona, Colorado, New Mexico, Utah, Wyoming.

District 10—California, Idaho, Nevada, Oregon, Washington.

The boundaries of these districts are tentative and were determined somewhat arbitrarily, though consideration was given so far as possible to contiguous territory, character of deposits, transportation conditions, climatic conditions, and competitive relationships. It is proposed to hold meetings of the producers of each district, or of a combination of districts as may appear most practicable, at which time the regional advisers who will go to form the membership of the Advisory Council will be selected.

The duty of the regional adviser will be to supply the Executive Committee and the Business Manager with such information as may be desired from time to time concerning the industry in the particular territory represented and in every way possible to give assistance in making work of the Association effective in that district.

It is further proposed to give assistance in the organization of State Associations when the formation of such organizations appears necessary in order to handle matters purely local in character.

The Olivine Company, of Milwaukee, Wis., has purchased the quarry, stone crushing plant and leases of the Marquette Trap Rock Co., at Marquette, Mich., and will assume the ownership on January 1st, 1920. Edward Copps, general manager of the Olivine Company, states that the company contemplates increasing the tonnage and products of the plant and also erecting a new plant at North Milwaukee.

The Beaver Portland Cement Company at Gold Hill, Ore., near Grants Pass, which recently underwent reorganization, has resumed operations. An output of 750 barrels per day for the present is planned by the new owners with an increase to 1,000 barrels shortly.

Marlboro Sand & Gravel Corp., New York City, with a capitalization of $500,000, has been incorporated by J. W. Kittrell, H. R. Every and M. H. Reiss, 7 East Fifty-sixth Street.

Hauling Problem Solved at This Quarry

Trucks Prove Unusually Efficient in Carrying Rock from Ledge to Crusher

ONE of the most instructive demonstrations of the efficiency of motor trucks may be seen every day at the John T. Dyer trap rock quarry, Birdsboro, Pa.

The Dyer quarry is the second largest deposit of trap rock in Pennsylvania. The output is 35 cars of crushed stone per day. From the floor of the quarry to the top of the sheer wall of rock is a distance of 180 feet. The crusher is a quarter of a mile away. Their transportation need was a method of hauling blasted rock from the quarry to the crusher. Single-horse carts had always been used, and economically so, as the Dyer Company thought, due to the fact that instead of having a driver for each cart they trained their horses to follow in single file in a line going to and coming from the crusher. About every 150 yards a man was posted to keep the horses in line.

However, in stormy weather when the road became muddy or the elements were growling thunder, expensive delays often happened through the horses becoming frightened or getting out of line. Some months ago, as an experiment to see whether motor equipment would reduce what they already thought was a minimum cost for this work, the Dyer Company bought their first Autocar.

Following is what they quickly found: One Autocar would haul 200 tons of stone to the crusher *every* day. Each round trip was a half mile, making 50 miles daily. This average is exactly equivalent of five single horse carts.

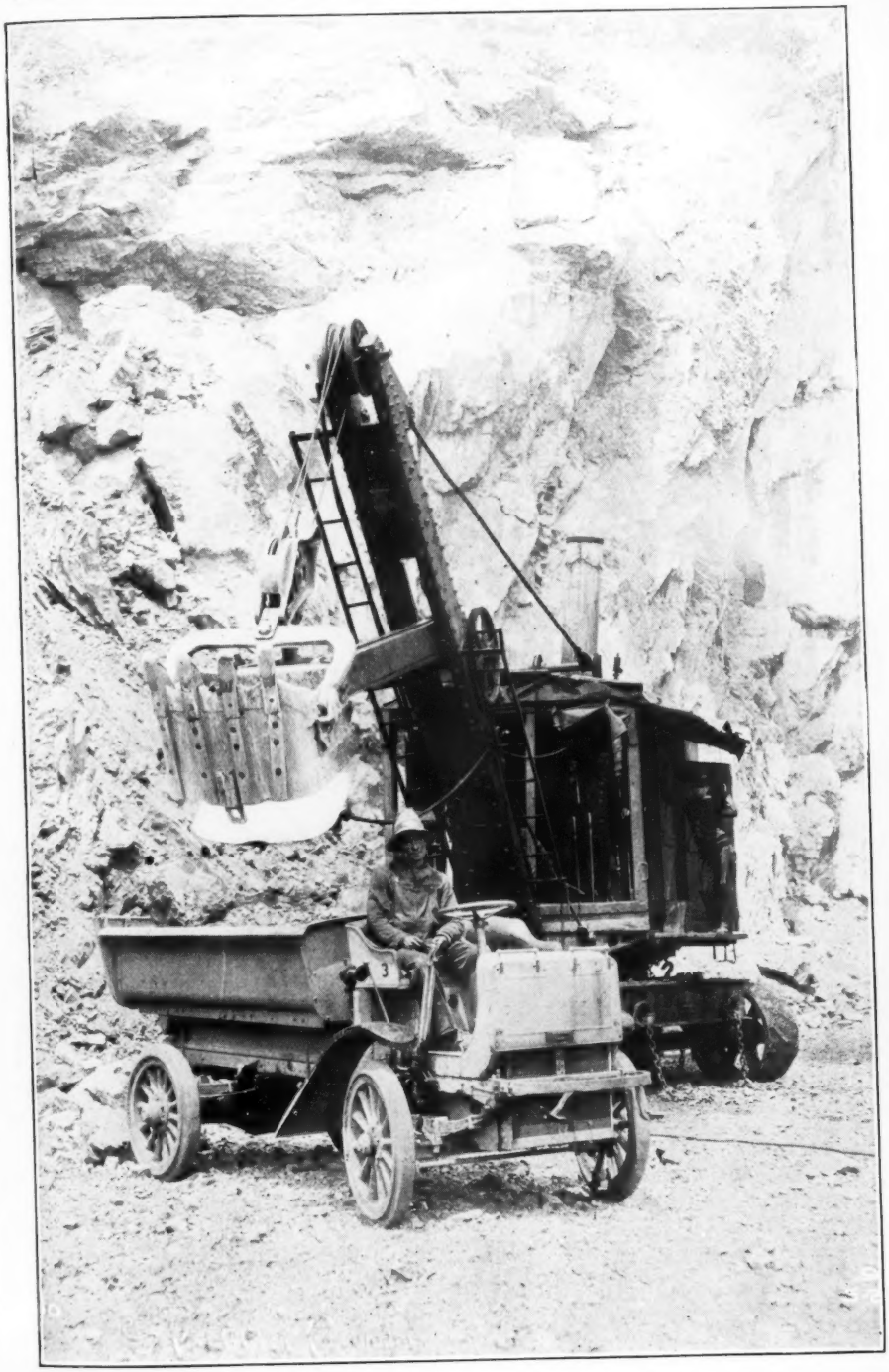
But it was not down in the quarry where the Dyer Company had their greatest problem to solve. Up on top of the 180-foot cliff, in order to drill for blasting, it was necessary to remove a depth of about 14 feet of soft clay. A steam shovel was hoisted and put to work. Then, four months after the purchase of their first truck, the Dyer Company phoned in their order for another. This truck was put to work hauling dirt along the narrow ledge of the cliff. One month later an order for the third truck was phoned in.

These two trucks working on a ledge not more than 20 feet wide move 600 yards of dirt per day. The haul from the shovel to the fill is now about 300 yards over a road which the Autocars built by dumping. The dirt is an oily, clinging clay, and upon the slightest rain softens so the trucks frequently work in mud hub deep.

Mr. Harry Schwartz, manager of the quarry, states that since the purchase of the first truck not one of their cars has been out of service a single day. To see the drivers of these trucks 180 feet up in the air passing each other on a 20-foot ledge, loading, backing and turning at the shovel, and often coming within 6 inches of the edge of the cliff, provides a thriller equal to those of the popular motion-picture variety.

The plate glass insurance companies of Elgin, Ill., have presented a petition to the mayor and city commissioners, asking for the regulation of the haulage of gravel through the business streets of that city. The claim is made that small stones dropped on the streets from overloaded gravel wagons are hurled through plate glass windows by the wheels of passing automobiles, and that considerable damage is caused in this way.

Owing to the strike of the employes of the United States Silica Sand Co., Ottawa, Ill., the plant has been closed down.



Efficient Motor Truck Service in a Quarry at Birdsboro, Pa.

Baggi

No. 8 H T YR E

increased speed

reduced labor

sanitary conditions

secure packing

THE LINE OF

MAXIMUM VOLUME

MINIMUM PAYROLL

SATISFIED WORKMEN

SUCCESSFUL SHIPMENTS

CONSERVATION OF MATERIAL

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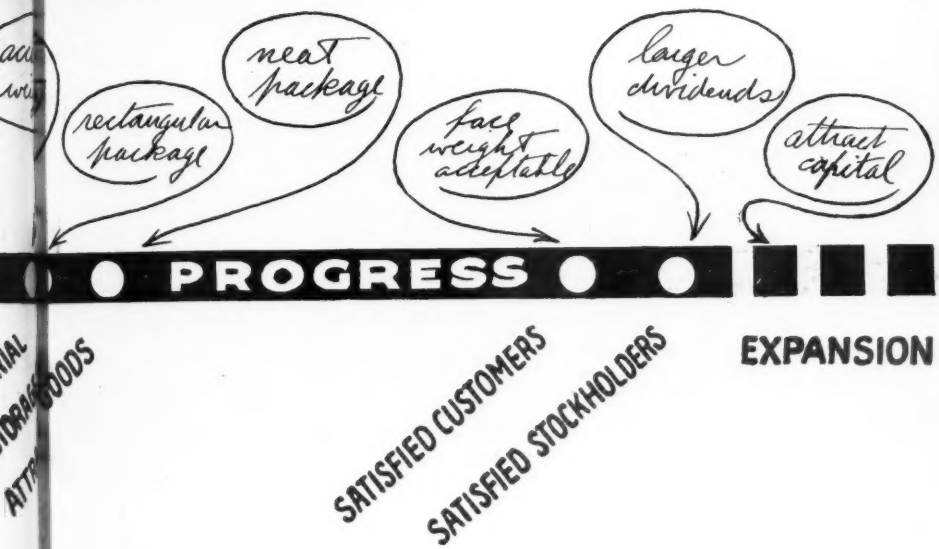

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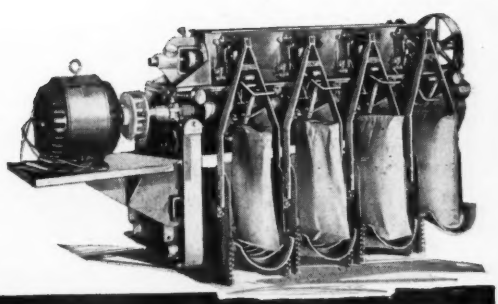

-BA VALVE BAG CO.
TOLEDO

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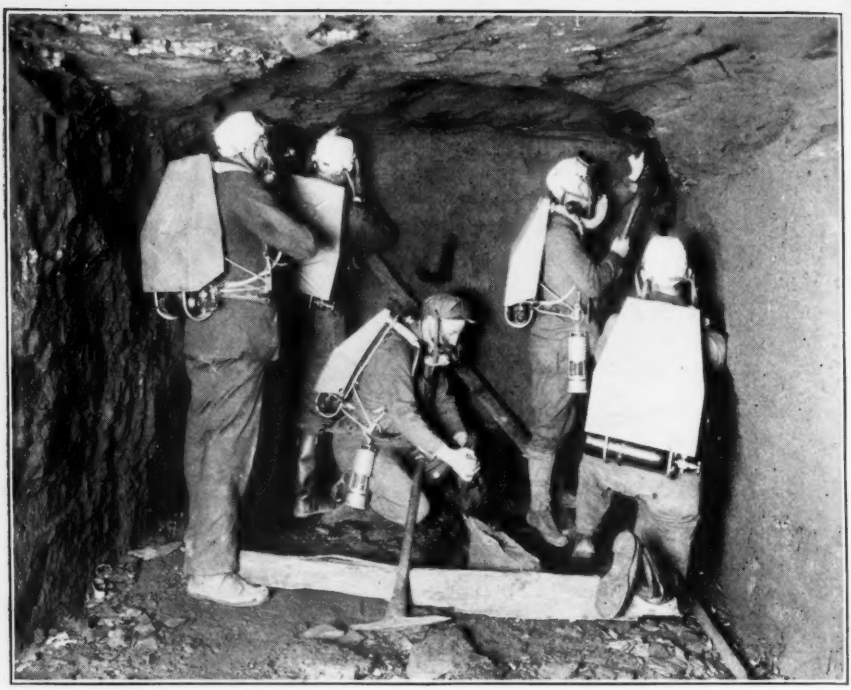
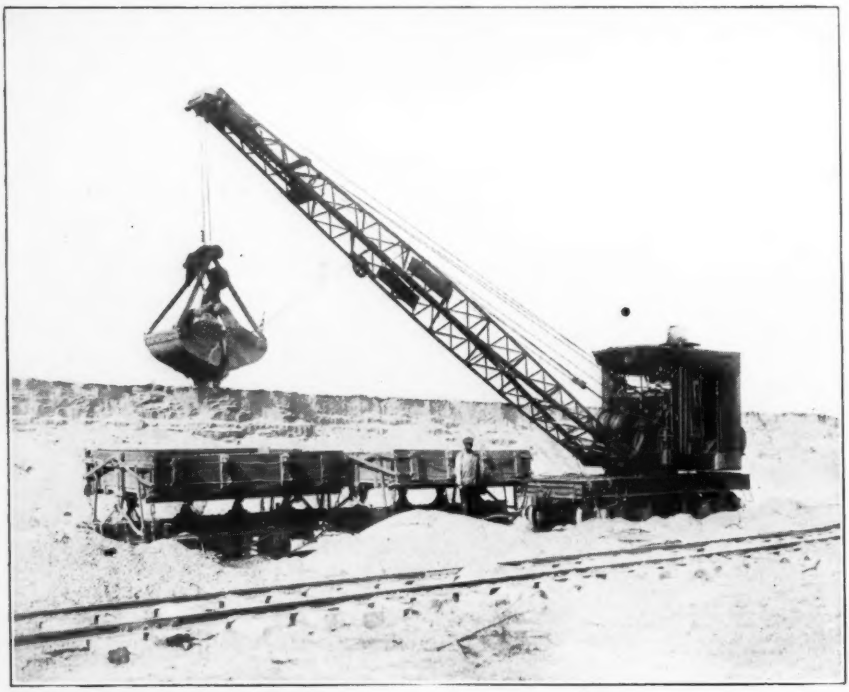


Illustrating the Use of Mine Rescue Apparatus



Brownhoist Locomotive Crane at Plant of Kirkpatrick Sand & Cement Co., Birmingham, Ala.

Electrical Precipitation in Cement Mills

BY M. C. TURPIN
Westinghouse Electric & Manufacturing Company

COINCIDENT with the greatly increased use of electricity as exemplified by motors driving various machines in countless industries, has come the intensive development of the other properties of this serviceable agent of man. Reference is made particularly to the use of electricity as a precipitating agent and for the decomposition of metals and chemical compounds.

Probably no one of the recent developments of the manifold uses of electricity offers more promise for financial return to a number of industries than its use for the precipitation of solid particles in gases generally allowed to escape into the air.

The dust and fumes usually discharged from the stacks of cement mills, iron furnaces and many other industrial plants, not only represent a waste of valuable material, but also frequently constitute a nuisance which it is exceedingly desirable to eliminate.

By means of electrical precipitation, which is unusually simple, economical and effective, potash is collected from the dust in cement plants, metal losses are reduced in copper and lead smelters, smoke nuisances in various kinds of plants are eliminated and in blast furnaces ore dust and potash are recovered. It is also used in gas plants for removing dust, tar and lamp black.

A visitor to one of these plants is easily convinced of the practicability of the process. He need only stand where he can watch the stacks leading from the treater while some one opens and closes the treating circuit. When the current is off, the familiar clouds of smoke pour out; but when the current is on, the smoke vanishes and nothing but a fine vapor can be seen. Final proof of the effectiveness of the operation is provided by the car-loads of precipitated dust taken out of the collecting bins.

One of the interesting features of this process is that, though originally designed simply to suppress a nuisance, it has in practice almost invariably proved a highly profitable investment, because of the value of the otherwise wasted material it recovers.

A certain cement plant has an equipment, which cost $180,000 to install and $10,395 a year in operating expenses. Though the material recovered is worth much less than copper dust, its value per annum at pre-war prices was $74,325, of which about one-third is cement dust at $1.00 a ton and two-thirds is potash at 70 cents a unit. This also represents a highly satisfactory profit.

The ability of this process to recover potash in commercial quantities from the vapors of cement kilns was a genuine surprise to the world and will undoubtedly have economic consequences of the greatest importance.

The process, which is the invention of Dr. F. G. Cottrell, now chief metallurgist of the Bureau of Mines, is exceedingly simple in theory and easy of application. It consists in passing the dust laden gases through an intense electro-static field which causes the solid particles in the gases to be precipitated on the positive and negative electrodes of the electric circuit. This is the same principle as exemplified in the familiar experiment in high school physics when a pith ball attached to the end of a string is attracted by a piece of amber, rubber

or glass, which has been electrified.

The process requires a high voltage direct or uni-directional current which may be obtained by several different methods. While it is possible to generate direct current at the potential usually required, from 25,000 to 65,000 volts, it is not practicable and the better plan is to step up the low voltage alternating current generally obtained from the local power plant and change it into a uni-directional current by means of a mechanical rectifier, which is similar in principle to the commutator of a direct current generator.

Low voltage single phase alternating current may be obtained from individual motor-generators on the shafts of which are mounted the rectifiers, which are generally of the mechanical disc type.

Power for the motor is obtained from the local power plant or from the lighting company lines. The generator supplies low voltage single phase current which is taken to the transformer and stepped up to a value varying from 25,000 to 65,000 volts depending on local conditions. It is then brought back to the rectifier which, driven by the motor-generator is, of course, in synchronism with the generator. The rectifier high voltage current is then taken on properly insulated lines to the treaters. This arrangement provides a separate outfit for each treater section.

Where the low voltage single phase current is obtained directly from a power plant or from a single motor-generator for all the treater sections, it is taken direct to a transformer and back to the rectifier which in this case is driven by a synchronous motor.

The method of application of the high voltage current to the dust or gases is temparatively simple, and may be explained as follows:—

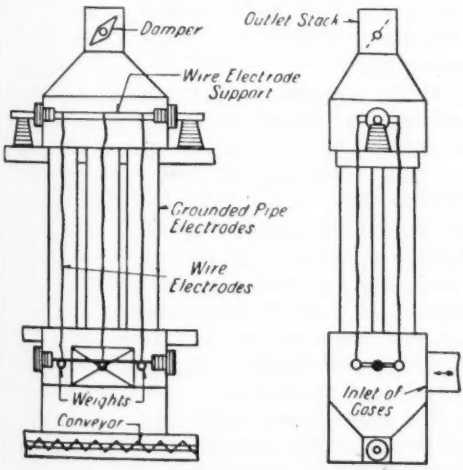
The accompanying schematic diagram illistrates a typical pipe treater which in general consists of two large horizontal flues connected together by a number of small vertical pipes. Gases enter through one flue, pass through the vertical pipes and are discharged through the other flue to a stack, exhaust fan, or other draft producer. The gas is then exhausted into the atmosphere. Some treaters employ rectangular passages instead of pipes to connect the two flues. These are generally referred to as plate or box type treaters The principle of operation for all these types of treaters is the same.

The actual precipitation of the dust or fume occurs in the vertical pipes referred to above. Carefully centered in each, is suspended a small wire or a small chain. These constitute the negative electrode of the treater system. The inside surface of the pipes constitute the positive electrode. Each wire or chain is carefully insulated from its pipe and from the ground, and is charged to a high potential usually at from 25,000 to 65,000 volts direct current. The tubes themselves are grounded. Thus within each pipe is created an intense electrostatic field. The gases passing through this field become ionized, and the ions travel with high velocity in a direction at right angles to the electrodes causing the field. These highly charged ions are continually colliding with the suspended solid and liquid particles in the gas, and the ions impart a charge of like potential to such particles, which in turn begin to travel towards the electrode of opposite polarity. Since the negative suspended electrode is of much smaller area than the electrode formed by the inside surface of the pipe there is much greater electrostatic stresses per unit of area in the neighborhood of the wire, and as a result far greater ionization about the wire. Thus the gas receives a static charge of the same polarity as the wire, and the

solid or liquid particles in the gas receive charges of this same polarity which causes them to be projected against the inner surface of the pipes, where they tend to stick and accumulate until the electric power is turned off, after which the accumulation of dust is usually collected from the pipes by loosening it by rapping the sides of the pipes with mechanical hammers.

The dust falls down into hoppers from which it is loaded into bags. The dust comes out in a finely divided state and is entirely suitable for use as in fertilizer.

Operation of the plant is improved by regularly shaking down the dust and maintaining the proper tempera-



ture of the gases. Operating labor is reduced to a minimum as the operation is practically automatic with the exception of rapping the pipes and filling the bags.

In the operation of a cement plant employing the electrical precipitation method of recovering potash from the cement dust it is found that not only is the valuable material recovered that otherwise would be lost, but the production of cement has been improved and the fuel economy improved. Because of the necessity of closer attention to the kilns a better grade of clinker is obtained which seems to be coincident with the most efficient recovery of potash.

The Bureau of Soils of the Department of Agriculture, in a report issued some time ago, stated that in the production of Portland cement in this country, estimated to be 90,000,000 barrels a year, it could be safely assumed that the amount of potash escaping from the cement plants, would amount to 86,850 tons every year.

Under present conditions it is safe to assume that a recovery of at least 99 per cent of the dust is being obtained in these plants using the electrical precipitation process, from which it will be seen that the employment of this process opens up a wide and profitable field for the cement mills of the country, and one that they will doubtless use to a very considerable extent.

According to the report of J. Y. Jewett, an expert engaged by the Water Users Association, of Poenix, Ariz., to investigate all phases of the county highway commission's proposition that the association purchase the Phoenix Cement plant and engage in the manufacture and sale of cement, will cost $534,000 to effect the purchase of the plant and re-equip it for operation. The association will pass upon the matter at the next meeting of the shareholders.

The Vancouver Auto Truck Company, Vancouver, B. C., has purchased the business and property of the Star Sand Company. A new company has been incorporated to operate the combined business, to be known as the Vancouver Sand & Gravel Co. Incorporators, Clarence E. and Flossie G. McCurdy and R. E. Brudy. Capitalization, $5,000.

The Alberta Sand & Gravel Co., of Tuscaloosa, Ala., to buy and sell sand and gravel, with a capital stock of $5,000, all paid in, has been incorporated by W. F. Bowers and others.

Our Present Industrial Unrest

Extracts from an Address before "Our Country First" Conference in Chicago

BY CHARLES PIEZ
President, Link-Belt Company, Chicago

DURING the most prosperous period in our history, with the highest wages ever paid, with abundant opportunities for employment, with a universal public acknowledgment of labor's rights to a fuller and better life, and with an Administration and a Congress most responsive to labor's demands, we are confronted with a spirit of unrest which threatens the foundation of our social and political, as well as our industrial structure.

The Great War brought with it such an enormous demand for labor that privileges and concessions that had been the subject of controversy for a generation, were granted without hesitation, simply to insure that continuity of industrial processes necessary to victory. For it was victory we were after, even though we had to sacrifice industrial efficiency — yes, the very industrial system itself, to win it.

Our problem was output regardless of cost, and we got it at the sacrifice of those safeguards and restrictions which competition usually imposes on the management of business. Is it strange that with the unlimited opportunities opened up to labor by the war, it should have become conscious of its political power and its economic strength? Is it strange that labor should decline to surrender any advantage gained by the war, but should press for the control of industry itself?

If the Plumb plan is any gauge, then nationalizing the railroads, nationalizing the mines and the industries, does not mean Government ownership and operation in the ordinary acceptance of the word, but purchase out of public funds, with an absolute surrender on the part of the public of every form of control and direction to the employes, without power of revocation. I am referring to the Plumb plan as a symptom rather than as a possibility, but it shows the character of the malady. And when organized employes of the railroads tie up traffic in four states, and subject the public to loss and discomfort merely for the purpose of influencing a decision in a trolley strike with which the Railroad Administration was in nowise affiliated, it indicates that popular government, if its representatives lack courage, can be absolutely under the domination of an organized, selfish and unscrupulous minority.

I am opposed to government by coercion, by threat and intimidation, because it is subversive of the popular will. I am opposed to the general strike, that unAmerican instrument of labor oppression, because it attempts to win its point, not by its merit, but by putting an entire community to such inconvenience, trouble and loss that the public will insist on a settlement rather than submit to further pressure.

New terms have crept into our language that carry with them a threat and a menace. Bolshevism, the dictatorship of the proletariat, the direct actionist, the Soviet, the solidarity of labor. They are of foreign origin and receive but scant hospitality from American born workmen. I have no fear that Bolshevism will take root here, but I do feel that even the American born workman subordinates himself too readily to the domination of his union leaders, and that he is working on the theory that loyalty to the union, and not loyalty

to the public interest, is his first duty.

The union is supposed to be a form of democracy, controlled by the will of the majority; but there are few cases, indeed, in which the free and unrestricted views of the majority prevail. Meetings are subject to the same plays and tricks as political meetings, and rumors of packed meetings, coercion, intimidation, and other misuses of power, are by no means rare.

It is to the interest of the sane rank and file of the unions to see to it that pledges and agreements be kept in both spirit and letter; that methods and practices like systematic reduction of output be discarded, so that public sympathy, which heretofore has been unstintingly given to the aims and aspirations of labor organizations, be not forfeited through wrong and harmful methods.

The unsettled conditions incident to the war, and the general desire on the part of labor to get a large share of the profits of industry, have resulted in some marked reductions of output. I have it on good authority, in two of the large cities of the country, and we may assume this condition to be fairly general, that while formerly from 1,500 to 2,500 common brick laid in the wall per day, depending upon the kind of work engaged in, represented a fair day's work for a bricklayer, today it is impossible to obtain more than from 500 to 1,000 bricks laid under the same conditions. While this reduction has taken place over a number of years, the heaviest shrinkage in output has occurred during the past year and a half. And this reduction in efficiency is by no means confined to bricklayers, but is characteristic of some of the other building trades as well.

The complete unionization of the clothing industry is being accompanied by an abolition of the piece-rate system and by a reduction in the daily output per worker as well. Is it not timely to suggest a national investigation to determine to what extent a reduction of average output has tended to raise the price of certain commodities?

With such evidence as this before us, can we doubt for a moment that the insistence on the continuance of the "open shop" principle in industry is made in the public interest?

Greater production, greater thrift, and frugality are the most effective factors in reducing prices but increased production cannot be achieved unless wages be based on output instead of on hours worked.

The last two years have witnessed a wide extension of the eight-hour day, and if that has carried with it a corresponding reduction in output, and a proportionate increase in pay per hour, a very considerable increase in cost of commodities is accounted for.

I recognize, of course, that the objection of certain unions to piece work is well justified because of past abuses of this method of wage payment, but there can be no question of the fairness and soundness of paying a man for the amount of work turned out, providing the unit or piece-rate of compensation is fairly and equitably determined, and its permanency guaranteed. To meet the present urgent demand for increased production we can hardly leave it to the individual operator to determine what output a fair day's work shall represent; for we will sink inevitably to the capacity of the least experienced and least ambitious, for our standard.

Wages based on output, under safeguards that will correct and prevent abuses, should be accepted by organized labor in industries where this practice has been discarded.

There is no doubt that a considerable part of industrial unrest, and its companion, industrial shirking, grew

out of the exaggerated notions of profits which the intense industrial activity during the war was supposed to yield. No account was, of course, taken of the outlay for buildings and special equipment which had to be paid for out of profits, nor of the heavy inroads which Federal taxes made on the gross return.

Another and not an inconsiderable part of present-day unrest is due to the nonfulfillment of expectations growing out of the winning of the war. It was predicted that victory would bring in a new order of things, new social conditions, new relations between employers and employes in industry. Statements of this character were largely idealistic, and referred to an extension of rights and privileges to the downtrodden races of Europe, rather than to any promise of an increase in material advantages to our own citizens. But many people built high hopes on this rhetorical groundwork, and there is naturally keen disappointment that the armistice was not followed by an immediate improvement in the status and income of the individual. This was to be expected. To change from the excitement, the intense interest and the stimulus of war, to the commonplace and comparatively humdrum conditions of peace, required a mental readjustment of our people that could not be accomplished without manifestations of discontent and distrust. It will take time to complete the change, but in the meantime we have a much more critical industrial body to placate and satisfy, and we must look for a remedy to ally unrest and convince the workers they are receiving their fair share of the profits of industry.

The democratization of industry is glibly spoken of as one of the remedies, and the interpretation placed on this phrase ranges from the establishment of shop committees with authority in matters affecting the employment relations to the complete control of the industry by the employes. I am not at all impressed with the idea that by democratizing industry we can solve labor difficulties and maintain the health and prosperity of the enterprise as well.

Competitive industry isn't a social or charitable affair, it is a conflict, and leadership is required to bring success. Just as the Nation realized that arbitrary power must be concentrated in the hands of the President of the United States to make the nation's resources and facilities effective in time of war, so as to keep industry strong and sound it is necessary to place in the hands of the individual that runs it, positive and complete authority. No competitive business that I know of was ever successfully and profitably run by an executive committee or other form of divided authority. Democratization that goes so far as to inject a foreign and discordant element into the management of an industry, that reduces and splits up the authority of the executive (and I believe those to be the aims of the proponents of this suggestion), will either kill industry or reduce it to so moribund a condition that it will have to be kept alive at the public expense.

The prosperity of the country, the opportunities for employment, depend on keeping industry in a strong, healthy shape. Co-operative production, a form of completely democratized industry, has been demonstrated a failure. Governmental operation, another form of the same kind of management, has certainly not proved a success. Let us, therefore, resist any experiment or tendencies that will weaken and ultimately destroy the vigor and success of American industry.

Another suggestion to improve the employment relationship has been

profit-sharing, and new experiments are being tried at every hand. I am highly interested in the results, but as a means of allaying unrest and satisfying the worker, I am afraid most of these experiments are foredoomed to failure. The schemes that succeed will succeed because of the personality of the ma nbehind them, and not because of the merit of the schemes. Profit sharing as it is usually applied, involves payment to the deserving and undeserving; to the ambitious, energetic, useful employe, and to the laggard who succeeds in just getting by. It is apt to result, therefore, in general dissatisfaction, and a lowering of the standard of efficiency. Many plans have been tried, but a small fraction survive. The profits of the average industry are rarely sufficient to make the amount distributed to the individual large enough to stimulate and retain his interest, and only exceptional industries like that of Mr. Ford can continue to make really effective distribution. I like Mr. Ford's plan, for it consists in paying high wages and insisting that the employes earn them. My own conviction is that the best system for profit sharing consists in the opportunity for earning liberal wages for a standard amount of work performed, and that extra effort and output or extra quality, ought to entitle the man to earn wages in considerable excess of the prevailing rates. This gives the man an immediate additional return on work, that is within his own control, and does not force him to wait until the end of the year for an indefinite share in an uncertain profit.

The idea of taking labor into partnership is offered as another remedy. It sounds alluring, but, like profit sharing, is another one of those schemes it is difficult to make workable and permanently effective. In the first place, the average industry, with an investment of, say, $2,000 per employe, rarely earns in normal times as much as $1 per employe per day. When the return for capital invested is set aside and provision made for necessary additions and extensions, there is little or no cash to divide, and there is general disappointment among the partners. If any division is made, it must be made in stock, or its equivalent—it can't be made in cash.

Interest in the ownership of a business undoubtedly has a steadying, stabilizing effect, but this interest must be earned through thrift and sacrifice, and not demanded as a right. I will not admit that the success of the industry I am at the head of has been gained at the expense of our wage-earners, that its continued growth has been due wholly to them, and that its capital and surplus have been accumulated by withholding from the men a part of their just earnings.

Our industry, like many other American industries, started through the ingenuity, inventiveness and business sagacity of me nwho entered a new and untried field. It grew through the thrift and energy of these same men. They weathered its storms, stayed with it through its discouragements, and kept it in the van by the constant addition of new and useful developments, and by the addition of capital for the use of which they mortgaged their future. There are no wrongs to be righted, no redress to make, and no moral justification for turning over title to part of our business to our present wage-earners. I say this in full recognition of the splendid and valuable services rendered by some of our employes, because I feel that full compensation was given, not only for daily tasks performed, but for suggestions and extra services that were useful to the corporation.

And yet I am strongly convinced that a real pecuniary interest by the employes in an industry is a good

thing, provided that interest is paid for. Partnership must carry with it a sense of responsibility in the pecuniary success of the ventury, and cannot be helpful or effective if it represents an association in which one partner is purely interested in securing all he can for himself, without thought of the continued strength and success of the venture. I am in favor of opening up the opportunity for acquiring a stock interest in an industry to every workman whose length and character of service justifies it, and who has the nerve to assume the responsibility to pay for that interest in cash. And when the stock acquired by workmen and employes reached a proper volume I would gladly welcome a representative of their choosing as a member of the board of directors.

Representation on the board, except on the basis of stock interest, would not and could not bring about the purpose which the proponents of this suggestion have in mind, but would impair, if not untimately destroy, the very life of the industry.

I believe that the biggest problem industrial management faces today is the labor and production problem; that it transcends in importance the sales and the financial problems, and that it is worthy of the exclusive and direct attention of the chief executive.

Many of the so-called remedies are but substitutes for that direct contact and attention which the chief executive, amid the pressure of other duties, is unable to give. My suggestion to the executives of the industries is to get back in touch with employment, production and wage problems until a solution applicable in your case is found, and delegate to others the supervision of sales, finance, and general policies which now absorb all available time.

What a Crane Will Do

A bulletin illustrating and describing the Type B. Erie locomotice crane has recently been issued by the Ball Engine Company of Erie, Pa. It gives in condensed form on a few pages a large amount of information regarding these cranes, which are used by stone, and sand and gravel producers, as well as on many other types of work.

In this bulletin W. B. Manny, president, Hoosier Slide Sand Co., Michigan City, Ind., is quoted as follows regarding the performances of one of these locomotive cranes: "Saturday afternoon we loaded 300 tons into 6 cars in 2 hours and 10 minutes. We took sand from a point 3 to 8 feet below the level of the track. The above time included the moving from car to car, but not the running from our shed to start work. We have loaded a 55-ton car in 18 minutes. These tests are too speedy, and we do not expect to work the crane at that rate daily, but we were anxious to know what it really can do."

Crane Bulletin

The Edward F. Terry Manufacturing Co., Grand Central Terminal, New York, has issued Bulletin No. 5 on locomotive cranes. These cranes are especially built by the company to withstand the severe duty imposed by the constant handling of heavy materials.

The frame and platform are made of heavy structural steel, and the crane is equipped with exceptionally large, rugged clutches, and large steel gears.

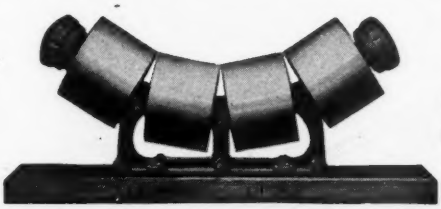
Two clutches are provided for each of the functions of swinging and traveling. This greatly simplifies the operations, eliminating the uncertainty as to the direction of motion when lever is thrown in.

The operating levers are banked on the right side of crane forward, giving the operator a good view of his work and at a distance from the heat of the boilers.

Should repairs be necessary, they can be quickly and easily made.

Users find this crane a rugged, speedy and dependable tool, with an abundance of power in steam, electricity or gasoline.

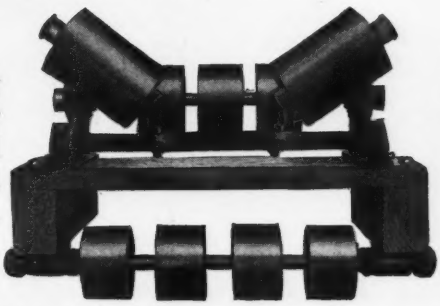
CALDWELL CONVEYORS

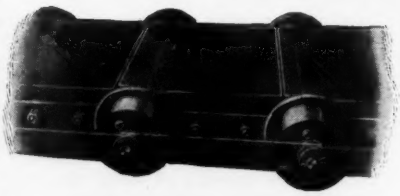


BELT CONVEYORS

Simple in design, economical of power, they give satisfaction. Different styles to suit your requirements.

A rough sketch showing conditions to be met at your plant, with capacity desired and power available, will bring our recommendations.





APRON OR PAN CONVEYORS

Flights or pans made of steel or cast iron, fitted to steel bushed self-oiling roller chain — complete with drives.

SCREW CONVEYORS

Steel "HELICOID" or Sectional flight screw conveyor for washing plants. We also make cast iron Screw Conveyors.

See Catalogue No. 38 for complete line of

Elevating, Conveying and Power Transmitting Machinery

H. W. CALDWELL & SON COMPANY
CHICAGO
Western Avenue, 17th and 18th Streets

U. S. Locomotive Crane with Grab Bucket

U. S. Locomotive Crane

The illustration above shows one of the new type of 20 to 30 ton locomotive cranes recently installed in a sand and gravel plant by the United States Crane Company, 122 South Michigan Avenue, Chicago. These cranes are designed and built by specialists in this line of engineering and are offered by the company in the belief that they are distinctly above the standard practice and can be relied upon to render satisfactory service under most exacting conditions.

It has a large boiler supplying steam for 10x10 inch engines while clutches of exceptionally large size give a wide margin of reserve capacity. The travel mechanism is so designed as to enable fast movement in service, as well as the use of the crane for switching of cars and general yard use.

Double drums provide for use of two-line grab buckets or drag-line excavator. An automatic counterweight device provides for keeping taut the tag-line of the grab bucket. In general hoisting work the two independently operated hoist drums enable the operator to have one line reeved up to the slower several-part hoisting block while the other line is free for single-line quick-hoist work.

Pump Bulletin

Dayton-Dowd, Quincy, Ill., have recently issued Bulletin 240 on centrifugal pumps. Every new piece of literature on this subject is of interest because of the rapid advance being made in the design of this class of equipment.

These pumps embody the most advanced principles of design, and those described and illustrated in this bulletin are presented by the company with the assurance that they represent the most modern, high-grade and efficient centrifugal pumps possible to produce.

The Bulletin includes a large amount of useful information and is altogether worth having.

All About Buckets

George Haiss Mfg. Co., of New York, has recently issued Booklet 719 showing the use of Haiss buckets for excavating and rehandling of stone, sand, gravel, etc.

These buckets adapt themselves to any material or any method of handling, such as derricks, traveling cranes, etc. The booklet illustrates and describes all types of buckets manufactured by the company and will be found of considerable value. It will be sent by the company on request.

Labor-Saving Equipment

WE develop and manufacture time-and-labor-saving machines for the contractor's construction plant, as well as for the handling and preparation of stone, gravel, sand, etc., for the market.

Investigate Link-Belt for elevating, conveying and power transmission, sprockets, bucket conveyors, belt conveyors, wagon loaders, screens, cranes, etc. Our engineers have specialized in the study of your problems. Let them help you in selecting mechanical equipment suited to your requirements.

Book No. 213 shows many installations of Link-Belt Machinery of interest to you. Write for a copy.

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LINK-BELT

Labor-Saving Equipment

Marion Excavating Equipment

The Marion Steam Shovel Company has just issued a new catalogue, No. 188, illustrating and describing the company's complete line of excavating machinery, including steam shovels, dredges and kindred equipment.

Regarding the general Marion policy the catalogue says: "In the first place, the design of Marion shovels is the product of more than a third of a century's experience. Our engineers are practical shovel men. They have seen service in actual operation of shovels. They know what different kinds of work require of a shovel, what parts are subject to the most wear and tear in another kind of work. They have watched closely the new requirements and have improved and refined the design to more than meet them. They have proportioned and balanced each shovel to withstand hard usage, and to eliminate breakdowns. They have made the Marion easily accessible for overhauling and repair, easy to operate, profitable to use and maintain."

These shovels have found a great deal of favor in pit and quarry service because of their adaptability to conditions and the ease with which they are handled. The catalogue gives complete descriptions of the various types of machines made, together with illustrations of almost every kind of use.

Barber-Greene Enlarging Factory

The Barber-Greene Company, Aurora, Ill., recently began work on the construction of a 180x90 ft. addition to their factory. The constantly increasing demand for B-G standardized material-handling machinery, B-G belt conveyors and B-G self-feeding bucket loaders has made this added room necessary in order to furnish prompt deliveries. This is the second time this year that additions have proved necessary in keeping up with orders. The new building will be used as the assembly department and will be modern throughout. Reinforced concrete with continuous sash windows, steel trussed roof, railroad track and loading platform inside walls are a few of the features incorporated in the design. The Federal Bridge Company of Waukesha, Wis., was awarded the contract for the steel work and the remainder is being handled by the Barber-Greene Company themselves.

Chicago Pneumatic Erecting New General Office

The Chicago Pneumatic Tool Company plans moving its general offices from Chicago to New York and toward this end is erecting an office building at 6-8 East Forty-fourth Street, New York City.

The structure, which is being built by the Westinghouse Church Kerr Company, is of combination steel, brick, and limestone, and will comprise initially ten stories, all to be occupied by the company. The ground floor is to be an attractively designed permanent exhibition room and will contain an interesting display of the many Chicago Pneumatic products, including Boyer pneumatic hammers, Little Giant pneumatic anad electric tools, rocks and coal drills, Giant oil and gas engines, air compressors, et cetera, some of which will be shown in operation. In conjunction, a completely equipped service station will be maintained.

The operation of the company's six American plants and twenty-six sales and service branches can be directed more economically from New York. There will be continued in Chicago a sales and service organization more extensive than formerly.

The new building is to be ready for occupancy early in 1920, at which time the transfer will be effected.

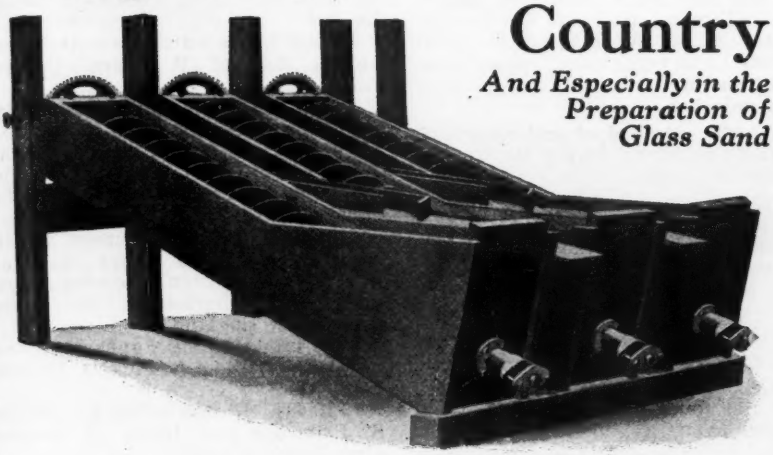
Transmission Equipment

R. & J. Dick Company, Inc., Passaic, N. J., have issued a new catalog on the Barry Pulley and Modern Transmission Appliances. Before taking up this line the company made exhaustive tests of these appliances, much more severe than would be possible for them to have under ordinary operating conditions. These tests satisfied them that the Barry lines were just what they wanted, so that they have taken them up and are pushing them with all the force of their competent organization.

This catalog shows pulleys of all kinds and other pieces of transmission equipment, together with considerable data on transmission problems.

Used in Some of the Largest Quarries in the Country

And Especially in the Preparation of Glass Sand



LEWISTOWN
Sand Washers

These are reasonably priced, well built, compact outfits, which can be easily and quickly installed. They are simple in construction and efficient in operation. Extensively used in the manufacture of glass sand which is so much needed today in the making of optical lenses for field glasses, telescopes, etc., required by the Government.

If you are not acquainted with Lewistown equipment and service, it will pay you to look into it.

We are in position to assist you solve your problem of whatever nature, if it pertains to crushing, grinding, screening, washing, drying and conveying, as we manufacture a full line of this machinery and equipment. Drop us a line stating what you desire information on.

Lewistown Fdy. & Machine Co.

LEWISTOWN, PENN.

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20 cents each. State number of patent and name of inventor when ordering.

1,313,269. Method of and apparatus for stone-working. David W. Custer. Sydney, Australia.

1,313,352. Reclaiming and conveying apparatus. Francis L. Stuart, Washington, D. C., assignor to International Conveyor Corporation, New York, N. Y.

1,313,357. Aerial ropeway and the like. William H. Watkins, Hanwell, England.

1,313,358. Tractor for aerial ropeways and the like. William H. Watkins, Hanwell, England.

1,313,586. Means for operating switches for tram-roads in mines, quarries, or the like. Thomas Dixon, Langley Park, England.

1,313,695. Loading - machine, George W. Jackson, Chicago, Ill., assignor to American Power Shovel Co., Milwaukee, Wis.

1,313,715. Excavator. Clarence Marvin, Mather, Wis.

1,313,821. Stone-channeling machine. George D. Hunter, Bloomington, Ill., assignor to Sullivan Machinery Co., Claremont, N. H.

1,313,869. Mining-machine. Charles B. Officer, Claremont, N. H., assignor to Sullivan Machinery Co., same place.

1,313,911. Excavating apparatus. Joseph L. & Joseph Le R. Potter, Indianapolis, Ind.

1,313,993. Mining-machine. Robert H. Keffrey, Columbus, Ohio, assignor to Jeffrey Mfg. Co., same place.

1,314,011. Mining-machine. Edmond C. Morgan, Chicago, Ill.

1,314,031. Double-roll crusher. Charles T. Westlake, St. Louis, Mo., assignor to Commonwealth Steel Co., same place.

1,314,135. Gyratory screening device. Henry W. Falker, Ashland, Pa.

1,314,194. Screen for stone, slag, or the like. David B. Hoover, Pottstown, Pa.

1,314,246. Rock - drill. Omar E. Clark, Denver, Colo., assignor to Denver Rock Drill Mfg. Co., same place.

1,314,328. Hoisting-bucket. John F. Hickey, Port Henry, N. Y.

1,314,547. Screen. Thomas J. Sturtevant, Wellesley, Mass., assignor to Sturtevant Mill Co., Boston, Mass.

1,314,700. Dumping excavating-bucket. Joseph L. Potter, Indianapolis, Ind.

1,314,811. Rock-drill-operating mechanism. Edward P. Jones, Breckenridge, Colo.

1,315,271. Mining-machine. William E. Young, Uniontown, Pa.

1,315,281. Reducing-mill. Edward B. Campbell, St. Louis, Mo., assignor to Williams Patent Pulverizing Co., same place.

1,315,385. Portable screen apparatus for coal and other materials. Charles M. Morton, Newcastle-upon-Tyne, and Charles H. Steavenson, Gateshead, England.

1,315,407. Jigging apparatus and process. William C. Pickett, Birmingham, Ala.

1,315,684. Power-shovel. William S. Primrose and Harry H. Schwenning, Lead, S. Dak.

1,315,903. Excavating apparatus. William J. Barnes, Macon, Ga.

1,316,046. Light-duty portable grading apparatus. August F. Kuester, Clintonville, Wis.

1,316,058. Excavator. Morton E. Pugh, Chicago, Ill.

1,316,181. Hoist. Walter M. Phares, San Francisco, Cal.

1,316,349. Cutter for dredges. Leo R. Calder, Charleston, S. C.

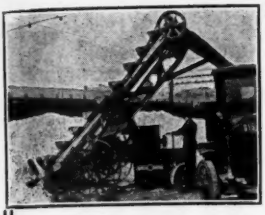
1,316,406. Hammer mechanism for rock-crushing and other purposes. John R. Abbott, Council Bluffs, Iowa.

Biehl Industrial Equipment

The Biehl Iron Works, Inc., Reading, Pa., have issued Catalog No. 8 covering Biehl industrial cars and equipment.

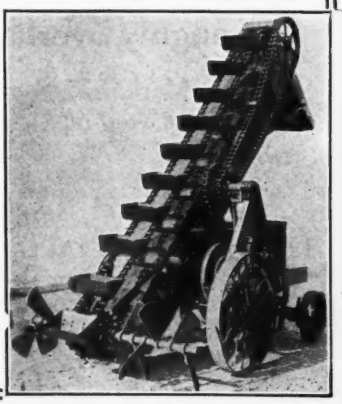
This line of steel cars includes types for practically every class of work, together with car unloaders, buckets of various types, and other smaller type of equipment for stone, sand, and gravel producers, contractors, etc.

The Cass City Sand & Gravel Co., Cass City, Mich., recently organized, has taken over gravel lands adjoining the Grand Trunk tracks, south of Cass City. Machinery will be installed immediately and the company looks for an output of 20 cars daily by spring.



Why Throw $1.94 Away

on every 5 cu. yd. truck load of sand, crushed stone, or gravel? This happens every time the truck is loaded from ground storage by hand shoveling. The greatest invention for digging these materials is the Haiss *"Path Digging"* wagon loader. Truck after truck can be loaded without a shovel touching the material. One man's wages and some gasoline will load 5 cu. yds. in 5 minutes. Works as fast in low piles as in high banks. If you know you can save this money, you can be certain then of the profit on your contract. Booklets 218 and 219 tell how.



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OSGOOD 18 ¾ yd. Traction Revolving Steam Shovel

is a splendid investment and one that has earned substantial profits for many companies operating Stone Quarries, Sand and Gravel Pits, etc. Its wide range of action and high dump make it especially popular.

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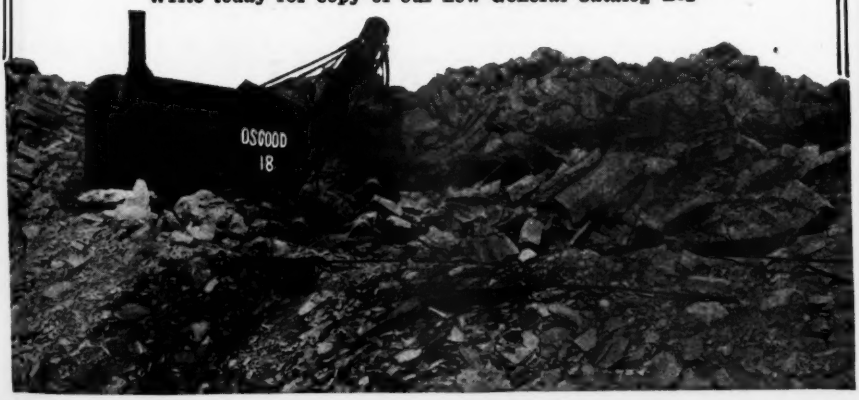
Write today for copy of our new General Catalog D-2



USED EQUIPMENT BARGAINS

Steam Shovels

Special attention is called to the following thoroughly overhauled shovels. Good as new.

1—Marion 75, 4-yard, No. 2191
3—Marion 60 Shovels, Nos. 1995, 1999, 2059

LOCOMOTIVES

8—18-ton, 10x16″ Dinkeys, 36″ gauge
2—12-ton, 9x14″ Dinkeys, 36″ gauge
1—10-ton, 7x12″ Dinkeys, 36″ gauge

DUMP CARS

50—12-yard Western standard gauge
25—K. & J. and Oliver wood beam, 36″ gauge

PUMPS

1—Novo Centrifugal Pump, 4″ suction, 4″ discharge
1—F. M. Centrifugal Pump, Size 5.
2—Emerson No. 4 Pumps
2—Barnes Diaphram No. 1. Pumps
2—Barnes High Pressure Force Pumps

SPREADER CARS

1—Western Narrow gauge spreader

All equipment we offer is thoroughly repaired before shipment

H. Kleinhans Company Union Arcade, Pittsburgh, Pa.

USED EQUIPMENT BARGAINS

Cooley's Equipment Bargains

BOILERS

1—75 H.P. Johnston Bros. Locomotive Type Boiler, 45 in. dia., 18 ft. long. Double Butt Strapped Hollow Stay-bolts, 125-lb. pressure.
1—42x105 Upright Boiler.

CLAM SHELL BUCKETS

1—1 yd. Industrial Clam Shell Bucket.
1—1-yd. Browning Clam Shell Bucket.
3—2-yd. Brown Hoist Coal Buckets.

JAW CRUSHER

1—12x15 Acme Portable Jaw Crusher mounted on steel trucks—equipped with elevator and revolving screen. Complete plant. Bargain. Write for price.
1—14x20 Aurora Jaw Crusher with 22-ft. elevator.

SHOVELS

1—No. 0 Thew full Revolving Traction Shovel ¾ yard dipper, Butt Strapped Boiler. Shovel in excellent condition and ready to go right into service. Exceptional Bargain.
1—Class 2 Victor 45-ton Shovel—1½ yd. dipper. Used on one job. Fine condition. Low price.
1—70 C Bucyrus Shovel, 2½ yd. dipper.
1—A.O. Thew full revolving traction Shovel, ⅝-yd. dipper, butt strapped Ohio boiler, A-1 condition.
1—No. 18 Osgood full revolving traction Shovel, ¾-yd. dipper, Ohio boiler, A-1 condition; bargain.

CARS

22—All steel two-way, side-dump, 1½-yd. capacity.

GRAVEL WASHING OUTFIT

1—Stephens Adamson gravel washing outfit, complete with No. 2 Aurora Crusher and 59-ft. elevator. Used on one job. Fine condition.

SLACKLINE OUTFIT

Consisting of Double Cylinder, Double Drum, O. & S. Hoisting Engine with Boiler, ¾-yd. Cable Excavator Bucket, 330 ft. main track cable, 1 in. diameter, and two haulage cables 440 ft. long. All cable plow steel and used only short time.

ROLLER

1—10-ton J. I. Case 3-wheel, double-cylinder Steam Roller, Shop No. 23594, equipped with extra front tractor wheels and axles to convert roller into tractor. Also 42 detachable spurs for each rear wheel for scarifying. Exceptionally low price. Delivery about Oct. 15th.

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1—No. 10 Rex Chain Belt Paving Mixer, steam operated. Equipped with spout discharge. Capacity 2 bags.
1—No. 6 Koehring Steam Paving Mixer, A-1 condition.

GYRATORY CRUSHERS

1—No. 5 Style K Gates Shop No. 7224. The only difference between this and a new crusher is the price. Guaranteed to pass any inspection.

also

3—No. 4 Gates.
1—No. 3 Gates.
1—No. 6 K Gates.
1—No. 4 K Gates.
1—No. 8 K Gates.
1—No. 7½ Austin.
1—No. 5 Symons.
1—No. 8 McCulley.
1—No. 3 McCulley.

SCREENS

1—40"x18 Rotary Screen.
1—24"x6 Rotary Screen.
1—48"x12 Austin Rotary Screen.
1—48"x16 Austin Rotary Screen.

HOISTING ENGINES.

1—Double Drum Double Cylinder. 7x10 Lidgerwood Hoist with boiler.
1—8¼x10 Three Drum American Hoist with Ohio Boiler.

LOCOMOTIVES

1—9x14 Vulcan 36" Gauge Saddletonk.
1—Whitcomb Gasoline Locomotive used 2 months, 8 tons standard gauge.

COMPRESSORS

1—8x8 Gardner Air Compressor Belt Driven with Receiver.
1—Class A-C Ingersoll Rand two stage Air Compressor Cylinders 20x24x22½x14.

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1—O&S 15-ton, 4-wheel, standard gauge 40-ft. boom butt strap boiler.
1—Brownhoist, 20-ton, 8-wheel MCB equipped with 50-ft. boom.
1—Link Belt, 20-ton, 8-wheel, MCB, equipped with 50-ft. boom.
1—Byers auto crane, 30-ft. boom, ½-yd. clam shell bucket.

STEAM SHOVELS.

1—70-C Bucyrus.
1—No. A-1 Thew on traction wheels.
1—30-ton Vulcan.
2—No. 0 Thews on traction wheels.
1—Type "B" ¾-yd. Erie.

DRAGLINES.

1—Lidgerwood, 65-ft. boom, 1½-yd. bucket.
1—Monighan, 50-ft. boom, 1-yd. bucket.

LOCOMOTIVES.

1—45-ton 6-wheel switcher.
1—40-ton standard gauge 6-wheel switcher.
1—70-ton standard gauge 6-wheel switcher.
2—36-in. gauge steam locomotives.
1—24-in. gauge steam locomotives

CRUSHERS.

1—No. 5 T. L. Smith.
1—No. 5 Gates.
1—No. 5 Austin.

CARS.

10—16-yd. Western standard gauge.
15—12-yd. Western standard gauge.
3—40-ton standard gauge flat cars.
20—4-yd. Western dump, 36-in. gauge.

COMPRESSORS.

Class AA—2 Ingersoll Rand, straight line steam driven, two stage. Steam cylinder 14"x14", air cylinder 16¼x10¼x14".

HOISTS.

1—Flory 10x12 3D, equipped with swinger, complete with butt strap boiler.
1—American, 10x12 3D, with boiler.
1—Lidgerwood 9x10 DD, DC with boiler.
1—Lidgerwood 9x10 DD, DC without boiler.
1—Mundy 9x10 DD, DC with boiler.
1—Mundy 10x12 DD, DC with boiler.
1—American 8¼x10 DD, 3D with boiler.
1—Reliance 8¼x10 DD, DC with swinger and butt strap boiler.
5—7x10 DD, DC with boilers.
1—Double drum Belt Hoist, New.
30—others of various makes and sizes ranging from 10 to 100-H. P.

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1—Stiff leg derrick with 75-ft. boom, clam shell bucket operating.
3—Stiff leg derrick with 60-ft. booms for single line work.
1—25-ton all steel Guy derrick, mast 110 feet, boom 100 feet long.

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1—Hayward ⅝-yd. Orange Peel.
1—Butler Dragline, 2½-yd. Brand New.
1—Owen ½-yd. with teeth.
1—Hayward 1-yd. Orange Peel.
1—Williams Hercules, 1½-yd.
1—Hayward 1-yd.

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8—1½-yd., bottom dump, Western wagons, like new, used 3 days.

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BOILERS

1—200 H.P. Scotch Marine 2,000
1— 30 H.P. Upright 200
1— 15 H.P. Upright 100
1— 60 H.P. Upright 800
1— 50 H.P. Upright 700
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1—No. 7½ Austin Gyratory..... 2,500
2—20x24 Blake, each..... 2,000
1—No. 4 Gates Gyratory..... 1,000
1—10x20 Blake 750

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1—Rand Imperial Duplex, cap. 1,500 ft. 2,000
1—Ingersoll, 2-stage, air, belt drive, 600 ft. 1,000

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1—2½-yd. Bucyrus 500
1—¾-yd. Browning with boom and engine (new) 750

DRILLS

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1—5-ton Stiff Leg with steel bull wheel 500
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1—200 H.P. Allis-Chalmers Corliss. 1,250
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1— 70 H.P. Erie Center Crank..... 300
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1—Westinghouse 250
1—150 H.P. Stillwell Bierce..... 150

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1—Ingersoll-Rand BULL MOOSE B. C. R. Type Drill.

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We offer, subject to prior sale, 25 1-yd. capacity skip-cars.

These cars are brand new and are in A-1 condition.

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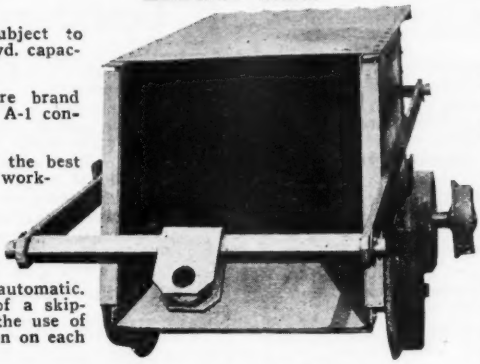

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These cars are 5'4" long, 2'5" wide by 2'4" high. Wheels 14" in diameter. Equipped with Hyatt Roller Bearings and built for any gauge track. Diameter of axle 2". Capacity, 1 yd. Weight complete, 1,215 lbs.

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2—15	" Type CCL	1750
2—15	Watson, slip-ring, var. speed	1720
1—15	Fairbanks-Morse	1200
1—15	General Electric, Form L	1200
1—15	General Electric	1200
3—15	Fairbanks-Morse, slip-ring, constant speed	1200
1—15	Westinghouse, vert.	1135
2—15	Allis-Chalmers	1130
2—15	Allis-Chalmers	860
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All first-class.

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Air Compressors—Belted

1—180 ft. Ingersoll-Rand.
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Boilers

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1—100 H.P. Casey-Hedges HRT, 110 lbs.
1—150 H.P. Atlas HRT, 100 lbs.
1—275 H.P. Heine Water Tube, 150 lbs.

Buckets

1—⅝-yd. Hayward Orange Peel.
1—1-yd. Hayward Orange Peel.
1—1-yd. Owen Clam Shell.
1—1½-yd. Hayward Clam Shell.

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2—10-ton 3-wheel, steam.
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No. 5 Gates Style D Crusher	1,250
No. 8 Gates Crusher	4,000
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6x8-in. Sand Pumps and Engine.
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7½ Austin Elevator, friction drum hoist, 30" gauge end dump quarry cars, miscellaneous 6" to 14" new and second hand belting, pulleys, screens, etc.

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1—20-ton, 8-wheel Industrial locomotive crane, with 45-ft. boom and 15-ft. extension. Arranged for bucket and with 1-yd. McMyler bucket. 24-ft. steel bunk and steel underframe.

Both cranes MCB., 125-lb. boilers, and ready for operation.

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1—No. 10 Gates Mang. flt., $6,500.
1—100 H.P. 440 V., 60 Cy., 3 Ph., motor, new.
1—312 Kva. 240-480 V., 60 Cy., 3 Ph. non-cond. Allis steam turbo.

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1½-yard end-dump cars, 36 in. gauge, 30-lb. rails, air drills, etc. State models, manufacturer, price, condition and point of shipment.
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2—20-ton Browning 8-wheel Cranes, with 48-ft. boom.
1—16-ton Ohio 8-wheel MCB Crane, with 40-ft. boom.
1—15-ton Browning 4-wheel Crane, with 42-ft. boom.

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1—20-ton Browning ⅞-yd. dipper, full circle, on traction wheels.
1—Bucyrus 85 C, first-class condition.
2—Marion, Model 60, first-class condition.
1—No. 3 Keystone.

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2—Smith Hot Mixers. Mounted on trucks, steam engine and boiler.

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1—18 x 24 Blake Type Jaw Crusher.

Both in excellent condition and ready for immediate shipment.

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2—complete crushing plants consisting of a No. 9 jaw crusher, 10x20 in., with an output of from 100 to 140 tons per day, a 20-foot elevator and a 30-ton stone bin, 12x30 ft., mounted on their own trucks. Bin has screen 12 ft. long, 30 in. diameter, and has ½ to 3-in. holes. Minn.
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1—Patnoe steel elevator, 60-ft. centers, 24-in. buckets, extra large head gear and pinion. At proper speed will elevate 200 tons per hour. Mich.
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1—No. 6, Style "K" Gates Gyratory.
1—No. 6, Austin Gyratory.
1—No. 7½ Style "K" Gates Gyratory.
1—No. 9, Style "K" Gates Gyratory.
1—No. 10, Style "K" Gates Gyratory.
1—No. 21, Style "K" Gates Gyratory.
1—60"x84" Power and Mining Superior Jaw, Rope Drive, with 300 H. P. Allis-Chalmers Motor for 3 ph., 60 cycle, 2200 volt.

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2—25-ton, 12x18, 4-wheel American.
3—30-ton, 13x18, 4-wheel American.
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1—40-ton, 14x22, 4-wheel Baldwin.

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1—No. 60 Marion Steam Shovel.
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ALSO: Boilers, Buckets and Skips, Compressors, Derricks, Drills, Drill Sharpeners, Drill Steel, Hoists, Pumps and Wire Rope.

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Wanted to buy two complete 24-in.

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total 600-ft. centers.

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Bucyrus shovel on railroad trucks, 65 ton, 2½ yd.
Bucyrus traction shovel, ½ yd. dipper.
35 ton standard gauge locomotive.
Caterpillar drag line, ½ yd. dipper.
Holt caterpillar tractor, 60 H. P.
1,800 ft. 36-in. gauge portable track; also 3-ton gasoline locomotive and cars.
5 Port Huron all steel reversible trailers.
American hoist with boiler, 6½x10 SDDC.
Franklin air compressor.
Compound duplex piston pump, 3 million gallons per day.
Sturdevant pulverizer.
Cleveland tractor.
10 Western 36-in. cars, 4 yd.
20 ton standard gauge Shay locomotive.

D. B. Straley, Crown Point, Ind.

Standard Gauge Locomotives

1—40-ton four-driver saddle-tank.
1—30-ton Vulcan four-driver saddle-tank.
1—40-ton 17x24-in. four-wheel switcher.
1—20-ton 11x16-in. Vulcan.
2—50-ton 18x24-in. six-wheel switchers.
2—10x16-in. 18-ton 36-in. gauge.
1—10-ton 36-in. gauge Shay geared.

10—6-yd. standard gauge Western dump cars, steel draft sills.
1—Western standard gauge spreader.
1—Model 76 Marion steam shovel.
1—Class 14 Bucyrus drag-line, 60-ft. boom, No. 733.
1—1-yd. Foote concrete mixer, with 20 H.P. boiler.

Locomotive crane, steam shovels, narrow and standard gauge cars, etc.

Industrial Equipment Co.
McCormick Bldg., Chicago, Ill.

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Baldwin 4-wheel, 40-ton switcher, 16x24; Industrial 20-ton M. C. B. 8-wheel Loco. Crane, 60-ft. boom; Brown Hoist, 15-ton M. C. B. 8-wheel Loco. Crane, 45-ft. boom, both with buckets and repair parts; Keisler 1-yd. Clam Shell Bucket; Gates 8 K. new Crusher, center discharge (chilled).

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Four Maney self-loading scrapers, one yd. size, new; also two I. H. C., 45 H.P., heavy oil tractors, in fine condition, ready for work.

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BUCYRUS 40-R—Yard and a half dipper, standard gauge type shop number 2254. Boiler perfect. Shovel in A-1 condition.

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The Longest Lived Steam Shovel Chain Ever Produced

TAYLOR MESABA

Cuts down expenses,
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Increases your yardage

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EXCAVATORS

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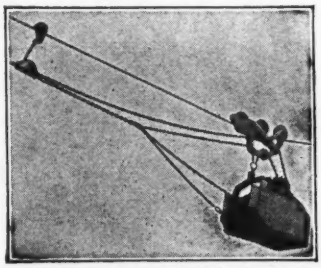
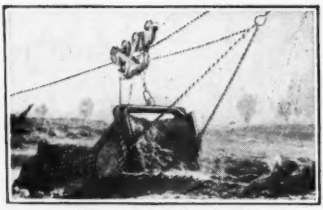


Sauerman excavator bucket with Shearer & Mayer dumping device.



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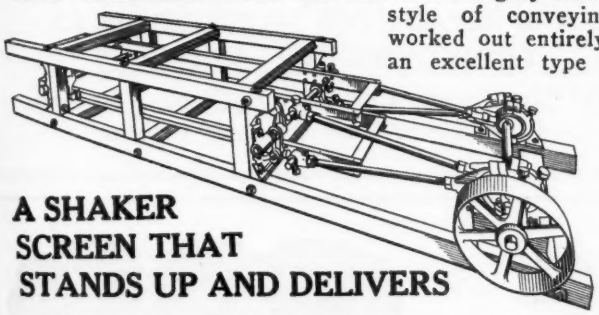

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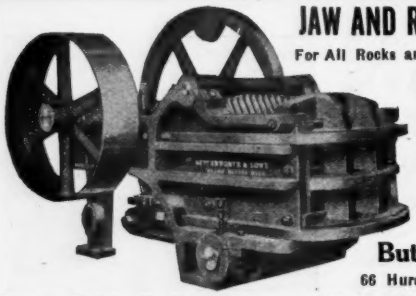

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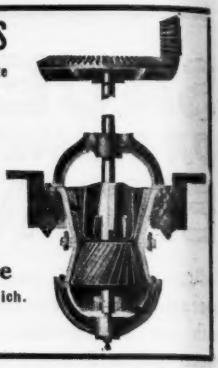

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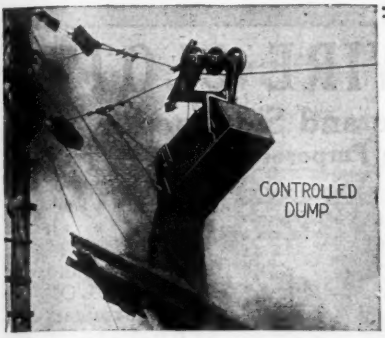

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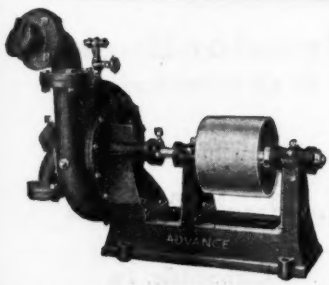

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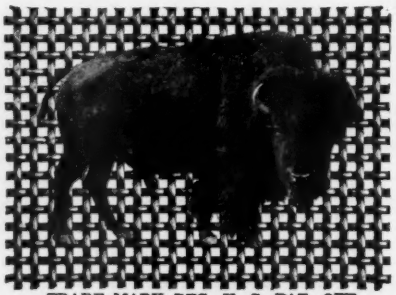

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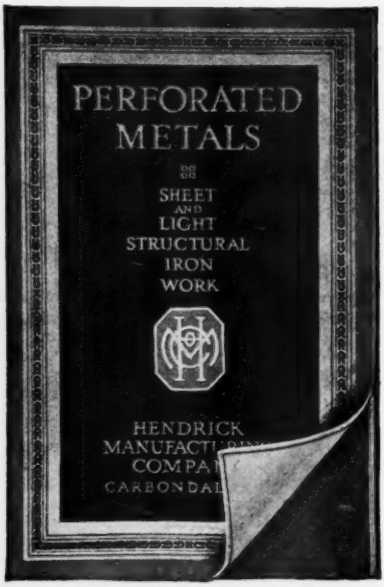

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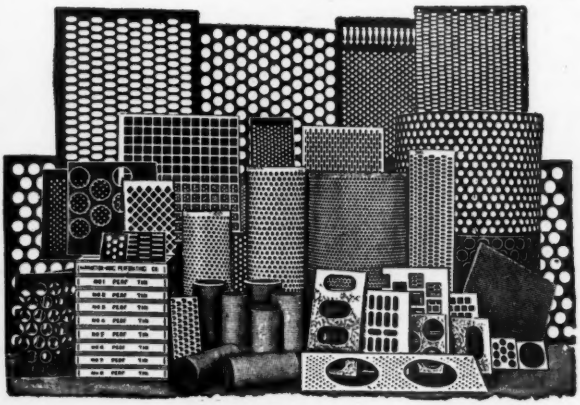

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Crane will do it just a little bit faster, better and cheaper than any other method. Investigate.

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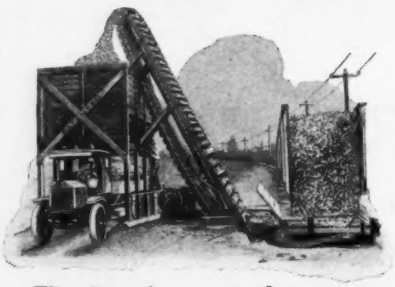

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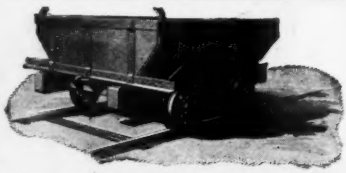

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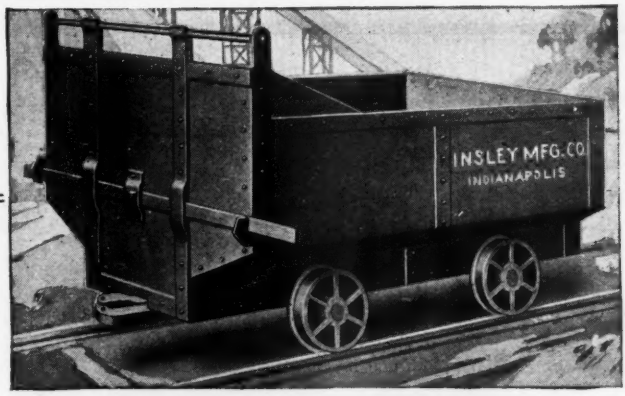

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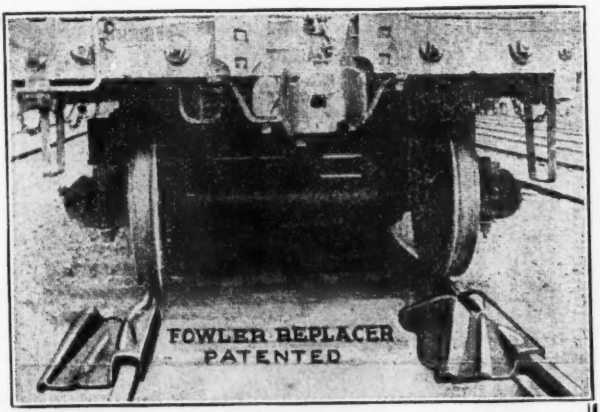

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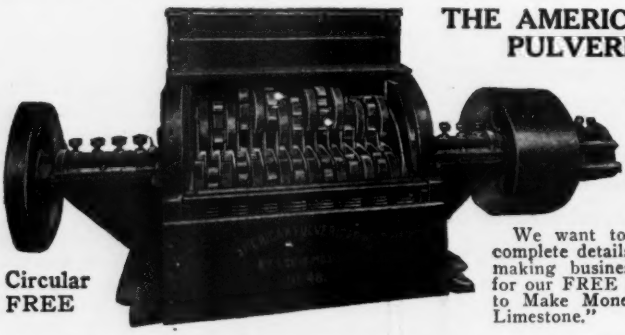

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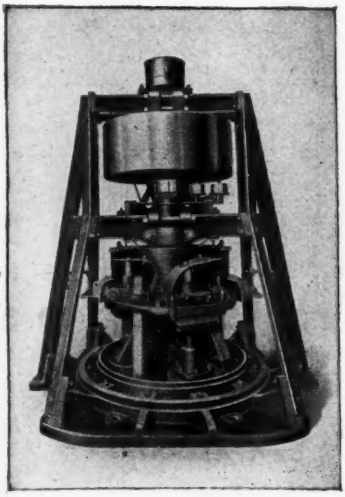

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Produces a fine-ground product cheaper than most other machines when producing coarse materials.

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We are prepared to furnish complete plans for agricultural limestone plants.

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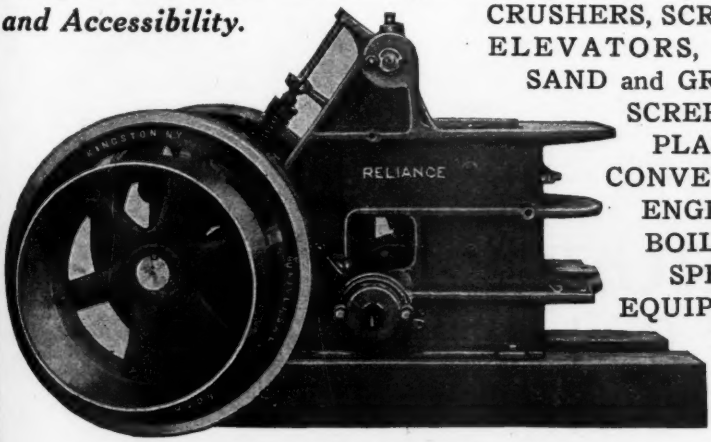

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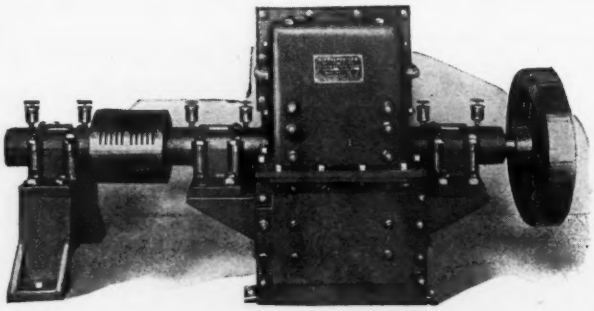

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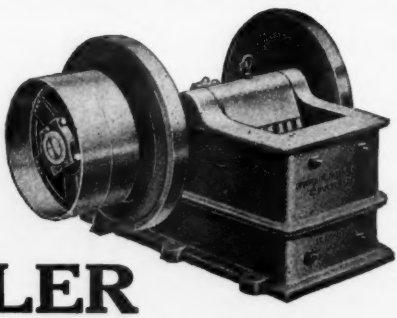

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Crusher — *Heavy Duty Jaw Type*

Has many special features and exclusive improvements. Write us for illustrated bulletin which gives full particulars, sizes, capacities and prices of the Gruendler. Write today.

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60-in. "Bulldog" Gyratory

Its capacity is over 2500 tons per hour.

A giant of this tremendous size was made possible only by Traylor "Bulldog" Design, with its bend-proof shaft, larger and longer eccentric, Hewes Spider, and many other patented features.

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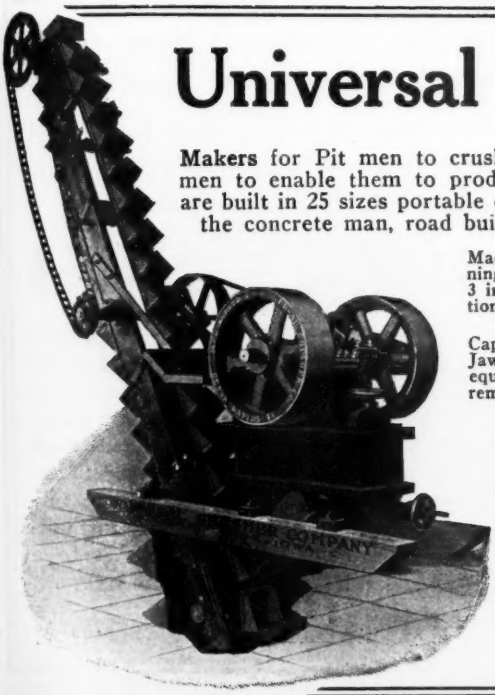

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Makers for Pit men to crush their oversize and Quarry men to enable them to produce small crushed stone for are built in 25 sizes portable or stationary, and are **Money** the concrete man, road builder and contractor.

Machines can be adjusted while running, to produce material varying from 3 in. to as fine as ¼ in. in one operation.

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"Adamite" is the high-efficiency material for crusher-jaws, eccentrics, pulverizer rings and rolls, liner plates, tires and rolls for cement mills, gears, pinions, etc. Wherever the wear and tear is continuous and severe, "Adamite" will **insure increased** tonnage and **decreased** costs.

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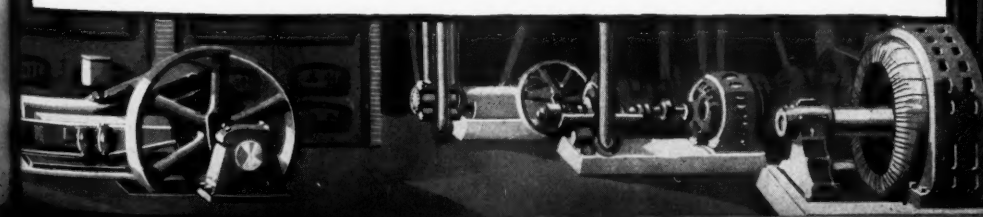

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What Can Be Done in Saving Coal

In the average steam plant, 57 per cent of the heat in the coal burned under the boilers is utilized in making steam and 43 per cent is lost—that is, of 100 tons of coal fired under the boiler, 57 tons is actually utilized in making steam, and 43 tons is not used, from various causes. Some of the large plants get results considerably better than this, but many of the small plants get poorer results. Records of the best performances show that about 80 per cent of the coal burned was actually utilized in making steam, and, although such high results can not be obtained with the existing apparatus or equipment in some plants, a requirement of 65 to 70 per cent is justifiable. Raising the average efficiency from 57 to 67 per cent means the saving of about 15 tons of coal out of every 100 tons.

How are these steam plants to increase their average efficiency from 57 to 67 per cent? This method is simple, and easy to understand, although to many it may seem slow in bringing results and perhaps tedious to follow. It is the application of the essential principles already mentioned —namely, good will and steady honest effort on the part of the fireman and the engineer; and the encouragement and appreciation on the part of the owner or manager of the plant. Only these means will bring the desired results. There is no miraculous powder that when dissolved in water and sprinkled over coal will make it give up more heat and produce more steam. All powders sold under such pretenses are frauds. Also, there are no patented devices that when attached to the boiler will automatically make large savings without the effort of the fireman or the engineer. Many patented fuel-saving devices have elements of merit, but they must have careful, intelligent attention to do good work. It has been said that there is no royal road to knowledge; if a man wants to understand, he has to study, learn and work. It can be said equally well that there is no royal road to saving coal; the engineer and the fireman must study, learn and work, each in his own way. Careful, sincere endeavor by the fireman and the engineer and the hearty co-operation of the owner are absolutely essential to success in any campaign for saving fuel. These requirements must be furnished by the men of the plant; they can not be bought on the market. On the following pages are given suggestions as to how these requirements should be applied.

The way the heat is lost is indicated, in a general way, in Figure 1. That is, in the average plant, about 4 per cent of the 43 per cent lost goes down with the ashes, 4 per cent is lost by radiation, and 35 per cent goes up the stack.

The Ash-Pit Loss

In the hand-fired plant the ash-pit loss is usually small because unburned combustible is easily detected in the refuse. If the ash contains much combustible, it can be readily seen without the aid of special instruments; also the loss from partly burned coal or cinder always seems much larger than it really is, because the fireman sees it in proportion to the small amount of ash formed rather than to the coal fired. Thus, if the coal contains 10 per cent ash, and 5 per cent of the coal fired falls into the ash pit, the refuse will be 10 parts ash and 5 parts unburned coal. In other words, one-third of the refuse would be unburned coal, a fact that could not escape the fireman's or engineer's notice. No fireman would keep on wheeling out refuse that is one-third coal without trying to improve his firing or attracting the engineer's attention to it, and even if he should be negligent enough to do so, he would very likely be reprimanded by the engineer or the owner, as soon as they noticed it. On the other hand, if the loss is small the fireman should receive some pleasant word of appreciation to encourage him in his effort. Deserved recognition will awaken interest in his work and pride in his skill. Suggestions for improvement are much more effective when they are made in a way that appeals to a man's pride.

The most common causes of a high ash loss are improper cleaning of

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fires, bare spots and useless poking of fires. If the cleaning is not properly done, a large quantity of combustible is pulled out of the furnace with the clinker and ashes. After cleaning, if there is not enough burning coal left in the furnace to cover the grate completely, and fine coal is fired, some of it sifts into the ash pit. Therefore, when fires are cleaned care should be taken that there is enough burning coal on the grate to start a good fire after the cleaning is completed. Effort should also be made to run the fires in such a way that few cleanings are necessary, and that these are done when there is little or no load on the boiler. Fires can be run longer without cleaning if they are built gradually with small and frequent firings. Heavy firings immediately after cleaning have a tendency to start troublesome clinker. In industrial plants a day's run should be started with a thoroughly clean fire, built gradually to full steaming capacity. Perhaps in no other kind of work is a good start of such advantage as in running fires.

Frequent poking of fires may cause an excessive loss from coal falling into the ash pit. Also the poking increases the tendency of the coal to clinker, thereby making necessary more frequent cleaning.

In some fires high ash loss is caused by bare spots on the grate. The firings may be so far apart that the fuel bed burns through in places. When the fireman attempts to cover these bare places the fine coal sifts into the ash pit. The remedies are to fire frequently and place coal on the thin spots before they burn through and form holes.

The Radiation Loss

The radiation from the boiler is usually small if the boiler has been properly set, and little can be done to reduce it. Of course, all steam and hot-water pipes should be covered with insulating material.

The Loss Up the Stack

In the average boiler plant, 35 per cent of the heat in the coal burned under the boilers is lost with the stack gases. That is, out of every 100 tons of coal burned under the boilers, the heat of 35 tons literally goes up the stack. It is this loss that can be greatly reduced and every effort should be made to do so.

The stack loss is so large because its magnitude can not be readily detected. Nobody can tell how much heat is going up the stack simply by looking at the stack. The density of the visible smoke is no indication of the amount of heat being lost. The magnitude of the loss can be found only by the use of special instruments and carefully kept records.

By far the largest part of the stack loss is heat held by the gases because of the high temperature at which they leave the boiler. This part of the loss is unduly large when too much air enters the furnace and the boiler setting; it can be greatly reduced by decreasing the excess of air and by lowering the temperature of the gases leaving the boiler. To burn 1 pound of coal requires about 14 pounds of air. This air enters the furnace at atmospheric temperatures and leaves the boiler at a temperature about 500° F. higher. It carries with it all the heat it absorbed in being heated through this temperature range of 500 degrees. Each pound of air absorbs approximately one-fourth of a heat unit (B. t. u.) for each degree of temperature rise. Therefore, each pound of air, in being heated 500 degrees, absorbs $\frac{500}{4} = 125$ heat units. Fourteen pounds of air absorbs $14 \times 125 = 1{,}750$ heat units. If, instead of 14 pounds of air being admitted for each pound of coal fired, 28 pounds is admitted into the furnace, the heat carried away by this weight of air will be $28 \times 125 = 3{,}500$ heat units, or twice as much as in the furnace using 14 pounds. Again, if the gases should leave the boiler at a temperature 1,000 degrees higher than atmospheric ,they would carry away twice as much heat as gases heated to only 500 degrees, and one pound of gas would carry away $\frac{1000}{4} = 250$ heat units. Therefore, the amount of heat carried away by the flue gases depends directly upon the weight of air entering the furnace and the temperature rise. Air entering the furnace in excess of about 14 pounds to a pound of coal burned is not necessary to good combustion, and the heat it carries away when leaving the boiler is wasted.

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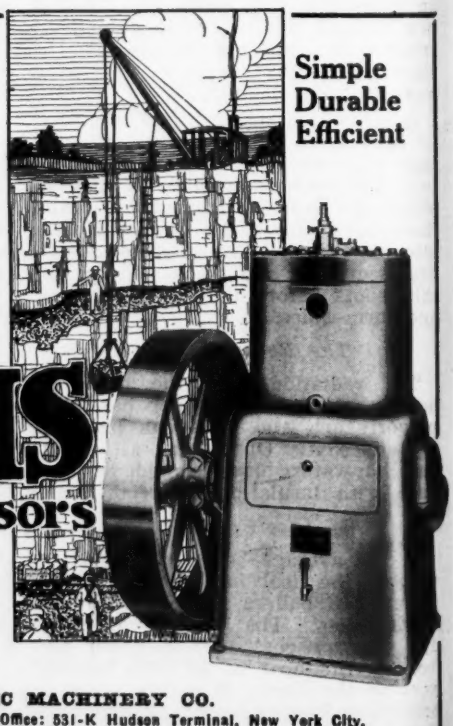

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Means of Removing "Scale Formers" From Water

The methods employed in softening water may be divided into two main classes, (a) those in which the scale-forming property is removed before the water enters the boiler, (b) those in which the softening is effected within the boiler itself by means of so-called "boiler compounds."

As to which one of the two classes of methods should be employed in any particular case would depend on the size of the plant, and on the character of the water to be softened. In the case of waters of abnormal composition, it would frequently be impossible to produce a satisfactory water by either method and a new water supply would be necessary.

It can not be too strongly emphasized that this question of water treatment is one in which the employment of competent chemical and engineering knowledge is both absolutely necessary and highly profitable, and it would be far wiser to omit all forms of water treatment (involving the use of chemicals) rather than to undertake such without knowing accurately the composition of the water and of the material used to soften it. It is most important to remember that the quality of the water, even when secured from the same source, varies widely from time to time. These variations are not only seasonal and monthly, but daily and even hourly. A condition of excessive concentration of the water after a protracted drought may be changed within an hour to a correspondingly excessive dilution by a summer storm. The result would be to decrease enormously the percentage of dissolved matter and to increase, probably to a much greater degree, the amount of suspended matter.

As an instance of the serious danger of an unintelligent "dosing" of boiler waters may be cited the results of a long series of investigations which have, apparently, shown that carbonate of soda in solution produces brittleness in boiler steel. Carbonate of soda (soda ash) is used in most water-treating processes and its unintelligent use may readily lead to a very dangerous condition in a boiler.

In spite of a great variety of trade names a very large percentage of all boiler compounds consist most largely of carbonate of soda, to which caustic soda is sometimes added, and occasionally phosphate of soda. Starchy materials, and those containing tannin are frequent ingredients. The supposed effect of these last two materials is to coat the particles of precipitated incrusting material and prevent its cohesion into compact scale.

Whenever competent supervision of boiler-water treatment is available within the plant organization, it is preferable to soften the water before it enters the boiler, and this must be done when the percentage of scale-forming ingredients is high.

Some Remedies For Air Leakage

Although air leakage is one of the most important causes of fuel waste, it is fortunately one of the easiest to remedy. Among the better class of materials for stopping large cracks and other openings in boiler settings are asbestos rope or wick and asbestos or retort cement. A boiler wall coating should then be applied over the entire setting.

Sometimes the owner is justified in applying a suitable insulation in sheet or block form and of proper thickness, furnished with a smooth, tight surface. This not only prevents the infiltration of air, but at the same time reduces radiation or loss of heat from the boiler walls.

Boiler walls may be made air-tight by applying to the outside of the wall a coating of material which will seal up cracks and which is itself elastic enough to permit expansion and contraction without cracking. Wide or large cracks should be caulked with asbestos wick before the air-tight coating is applied.

Open spaces around clean-out doors and between frames and masonry should be thoroughly sealed by means of a cement that will adhere to both iron and brick-work and that will not crack from expansion and contraction strains.

Defective fire-brick settings ought to be repaired and bricks set up or bonded together with a material which will not readily crumble or fuse away and will also resist the unequal stresses to which subjected.

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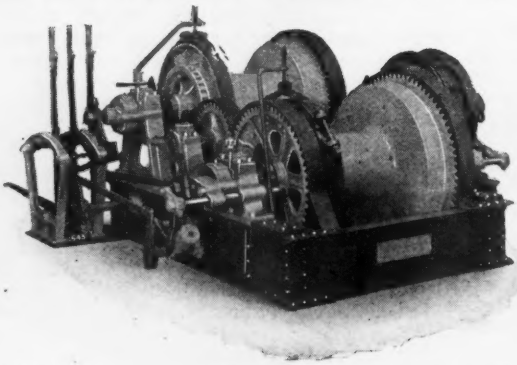

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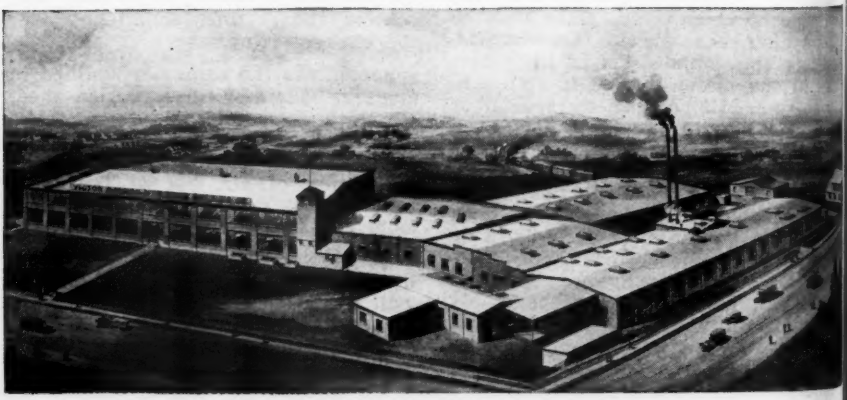

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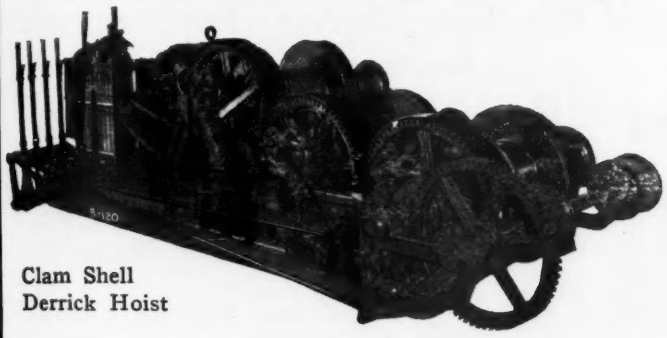

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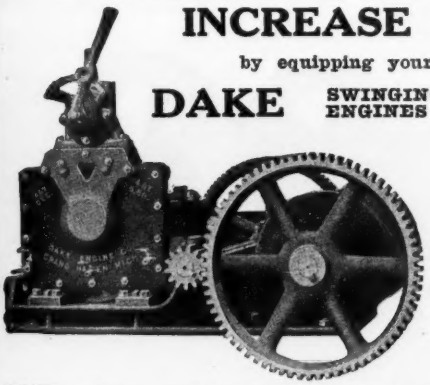

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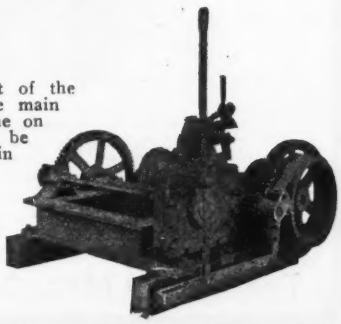

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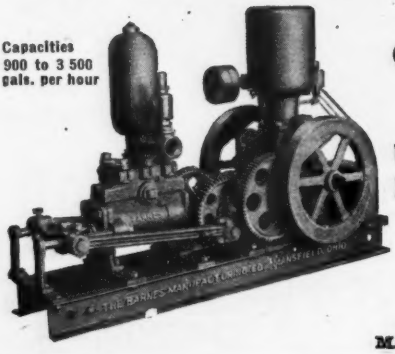

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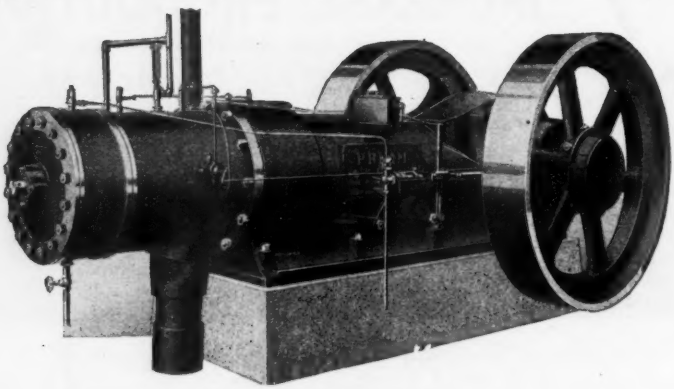

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